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San Dieguito Wetlands Restoration Project

Final Restoration Plan

Submitted To:
California Coastal Commision

Prepared By:
Southern California Edison Company

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PREFACE

This Final Restoration Plan (FRP) for the San Dieguito Lagoon Restoration Project is being submitted by Southern California Edison Company (SCE) to fulfill a requirement contained in the Coastal Development Permit (No. 6-81-330-A3, as amended) for the San Onofre Nuclear Generating Station Units 2 and 3 (SONGS).

The FRP is based on the project approved by the California Coastal Commission (CCC) on November 5, 1997 and evaluated in the Environmental Impact Report/Statement (EIR/S) certified by the San Dieguito River Park Joint Powers Authority (JPA) dated September 2000. On July 27, 2001 the San Diego County Superior Court ruled that the EIR/S did not comply with the California Environmental Quality Act (CEQA) and the Superior Court remanded the EIR/S back to the JPA for revision. However, on August 4, 2003, the California Court of Appeals overturned the Superior Court's ruling, dismissed the plaintiffs' petition and upheld the EIR/S.

CDP 6-81-330-A3 requires SCE to obtain approval of the FRP prior to applying for a CDP for the restoration project. However, in a letter dated January 20, 2004, the CCC stated that separate approval of the FRP no longer was necessary as an interim step and indicated that FRP approval would be considered concurrently with CDP adoption. Consequently, this FRP is submitted concurrently with a CDP application for the restoration project.

1. INTRODUCTION

1.1 BACKGROUND

Southern California Edison Company (SCE) is the majority owner and operator of the San Onofre Nuclear Generating Station (SONGS). The California Coastal Commission (CCC) issued a Coastal Development Permit (No. 6-81-330-A3, as amended; formerly permit No. 183-73) for the construction of SONGS Units 2 & 3 with the condition that SCE fund the independent evaluation of the impacts of SONGS' on the marine environment. The Coastal Development Permit (Permit) further requires that SCE mitigate any significant adverse impacts. The CCC determined that SONGS adversely impacted bightwide fish stocks and required SCE to mitigate those losses. As partial satisfaction of the mitigation requirements, SCE was required to create or substantially restore at least 150 acres of wetlands in Southern California.

After considering the results of a site-selection study that included an evaluation of eight potential sites throughout Southern California, the CCC concluded that the San Dieguito Lagoon (SDL) in Del Mar offered the best opportunity for achieving the full objectives set forth in the Permit. A public working group consisting of resource agency representatives, non-governmental organizations, and interested members of the public worked together to develop a reasonable range of practicable alternatives for restoration of the SDL. As required by the Permit, SCE submitted a Preliminary Restoration Plan for restoration of SDL to the CCC in September 1997. Following CCC approval of the Preliminary Restoration Plan in November 1997, the wetland restoration project entered the environmental review process pursuant to the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

The San Dieguito River Park Joint Powers Authority (JPA) took the role of state lead agency under CEQA and the U.S. Fish and Wildlife Service (USFWS) took the role of federal lead agency under NEPA. The JPA incorporated the SCE wetland restoration project into their overall Open Space Park Project (Park Project) for the San Dieguito River Valley area. A joint environmental impact report/environmental impact statement (EIR/S) was prepared for the entire San Dieguito Wetlands Restoration (Restoration Project) component of the Park Project, which includes the following elements: (1) creation or substantial restoration of 150 acres of tidal wetlands to fulfill SCE's SONGS Permit requirement, (2) restoration of additional wetland acreage for parties as yet unidentified, (3) creation of California least tern nesting sites, (4) establishment of public trails, and (5) a visitor center.

The EIR/S examined five alternative configurations for restoration of the San Dieguito Lagoon. These alternatives were designated: Mixed Habitat Alternative, Maximum Intertidal Alternative, Hybrid Plan Alternative, Maximum Tidal Basin Alternative, and Reduced Berm Alternative. Of these alternatives, the lead agencies determined, with input from the public and other interested parties, that the Mixed Habitat Alternative was the preferred configuration. The Mixed Habitat Alternative is similar to the design proposed in the SCE Preliminary Restoration Plan previously approved by the CCC. A detailed description of the proposed restoration plan is provided in Section 4.0 of the FRP.

A key element of both the approved preliminary plan, the EIR/S preferred alternative and this Final Restoration Plan (FRP) is maintenance of the San Dieguito lagoon tidal inlet in an open condition in perpetuity. The Permit, as amended, grants 35 acres of restoration credit for this commitment. Thus, SCE is required to create or restore at least 115 acres of wetlands in addition to the 35 acres achieved by maintaining an open tidal inlet. This FRP addresses both elements.

To secure an easement for perpetual inlet maintenance, SCE and the JPA are negotiating but have not yet executed an agreement with the inlet landowner, the 22nd District Agricultural Association (DAA). The agreement is expected to call for SCE to construct least tern nesting islands within the wetlands restoration area in return for an inlet maintenance and construction easement from DAA. The nesting sites are a requirement of a DAA Coastal Development Permit and are not a requirement of the SCE Permit.

As currently configured, construction of the nesting sites will impact approximately 2 acres of existing wetland. The CCC has advised the DAA that it is responsible for mitigating, monitoring and maintaining the nesting sites. These obligations for mitigation, monitoring and maintenance are the subject of ongoing discussions between the CCC and DAA. SCE anticipates resolution of these issues prior to the time when SCE begins construction on the wetland restoration.

Condition A, Section 2.1 of the Permit, requires SCE to submit to the CCC Executive Director a final restoration plan and CEQA/NEPA documentation within 60 days following certification of the EIR by the JPA and adoption of the Record of Decision (ROD) by the USFWS. A Draft EIR/S for the Park Project was released for public review in January 2000 and the Final EIR/S was completed on September 5, 2000. The EIR/S was certified by the JPA on September 15, 2000. However, the Del Mar Sandy Lane Association sued the JPA and SCE in San Diego County Superior Court on October 16, 2000, alleging that the EIR was inadequate in several areas and therefore did not comply with CEQA. On July 27, 2001 the Superior Court ruled in favor of the plaintiffs on several counts and remanded the EIR back to the JPA. SCE and the JPA appealed the ruling and on August 4, 2003, the California Court of Appeals overturned the Superior Court's ruling, dismissed the plaintiffs' petition and upheld the EIR/S. The USFWS then issued a ROD for the project on November 21, 2003.

1.2 FINAL RESTORATION PLAN PURPOSE

The FRP focuses primarily on the wetlands restoration effort proposed by SCE to fulfill the Permit conditions, which is the creation or substantial restoration of at least 150 acres of Southern California coastal wetlands within SDL as compensatory mitigation for fish losses caused by SONGS.

1.3 FINAL RESTORATION PLAN ELEMENTS

The FRP represents a stand-alone document that describes the elements of the FRP as specified by the Permit (Condition A, Section 2.1) are presented below. In addition, the section of the FRP where each element is addressed is indicated in parentheses.

a. Detailed review of existing, biological, hydrological conditions, ownership, land use, and regulation (Section 2.0).

b. Evaluation of site-specific and regional restoration goals and compatibility with the goal of mitigating for SONGS impacts to fish (Section 5.0).

c. Identification of site opportunities and constraints (Section 3.0).

d. Restoration design, including: (Section 4.0)

    1. Proposed cut and fill, water control structures, stormwater control measures, buffers and transition areas, management and maintenance requirements.

    2. Planting program, including removal of exotic species, sources of plants and/or seeds (local, if possible), protection of existing salt marsh plants, methods for preserving top soil and augmenting soils with nitrogen and other necessary soil amendments before planting, timing of planting, plans for irrigation until established, and location of planting and elevations on the topographic drawings.

    3. Proposed habitat types (including approximate size and location).

    4. Assessment of significant impacts of design (especially on existing habitat values) and net habitat benefits.

    5. Location, alignment and specifications for public access facilities.

    6. Evaluation of steps for implementation (e.g., permits and approvals, development agreements, acquisition of property rights).

    7. Cost estimates.

    8. Topographic drawings for final restoration plan at 1”=100’ scale with a one-foot contour interval.

SCE is ultimately responsible for the long-term management and maintenance of all aspects of the restoration project required for compliance with the SONGS Permit.

2. EXISTING CONDITIONS

2.1 LAND USE

The existing land uses in the project site and surrounding area are illustrated in Figure 2.1. The area and portion of total land attributed to each land use, within the project work area, are shown in Table 2.1. Most of the bordering lands, although shown in the existing land use map for context, are excluded from the land use calculations presented in the table. The map includes these additional locations to provide an overview of surrounding land uses that might affect or be affected by the project.

Table 2.1. Existing Land Use within the San Dieguito River Valley

Land Use Category	***Acres***	***Percent***
Open Space Reserves, Preserves ~~Vacant~~	577.76~~596~~	86~~48.0~~
Water~~Commercial/Commercial Recreation~~	63.14~~261~~	9~~21.0~~
Roads and Railroads~~Agriculture~~	17.84~~211~~	3~~17.0~~
~~Open Water~~	~~99~~	~~8.0~~
Recreation~~Recreation~~	5.16~~61~~	.7~~4.9~~
~~Roads and Railroads~~	~~6~~	~~0.5~~
Agriculture~~Single Family Residential~~	3.29~~5~~	.5~~0.4~~
~~Utilities~~	~~2~~	~~0.2~~
Spaced Rural Residential	.28	.04
Single Family Residential	.07	.01
Industrial	.06	.009
Multi-Family Residential	.05	.007
Total	667.65~~**1,241**~~	**100**

Note: Calculations in Table 2.1 are approximations

The largest land use category in the project area is ~~vacant land~~Open Space Reserves, Preserves followed by ~~commercial/ commercial recreation uses~~Water. *Open Space Reserves, Preserves* ~~Vacant lands~~ consist of areas to be retained in their natural state and protected from future encroachment, disturbance, or degradation. *Water* areas consist of the San Dieguito Lagoon, bays and the San Dieguito River.

Within the project boundary, active agriculture (e.g., tomatoes) is primarily located on the northern and eastern portions of the project area. A 0.03-acre parcel of land classified as Farmland of Statewide Importance overlaps a portion of the eastern part of the site and extends east and south of the site. Additionally, a 43-acre parcel of Prime Farmland is located in the northeastern portion of the site just south of Via de la Valle; it adjoins 152 acres of land classified as Farmland of Local Importance.
~~combination of areas such as previously cultivated transitional lands, wetlands, seasonal marsh, salt marsh, coastal foredunes, and portions of the California Department of Fish and Game Ecological Reserve. Most of the lands within the project boundaries described as *commercial use* are used for commercial recreation such as the Del Mar Racetrack/Del Mar Fairgrounds operated by the 22nd District Agricultural Association. The racetrack has a seven-week racing season (from the third week of July to the first week of September), and the Del Mar Fair operates for 20 days during the middle of June and early July. Approximately 200 other non-fair activities such as concerts, music festivals, and sporting events draw large crowds and are scheduled throughout the remainder of the year at the fairgrounds. While visitor use of the fairgrounds and racetrack do not directly affect the river, lagoon, and beach area, increases in vehicular traffic, parking, and pedestrian crossings occur when the fairgrounds are in use.~~

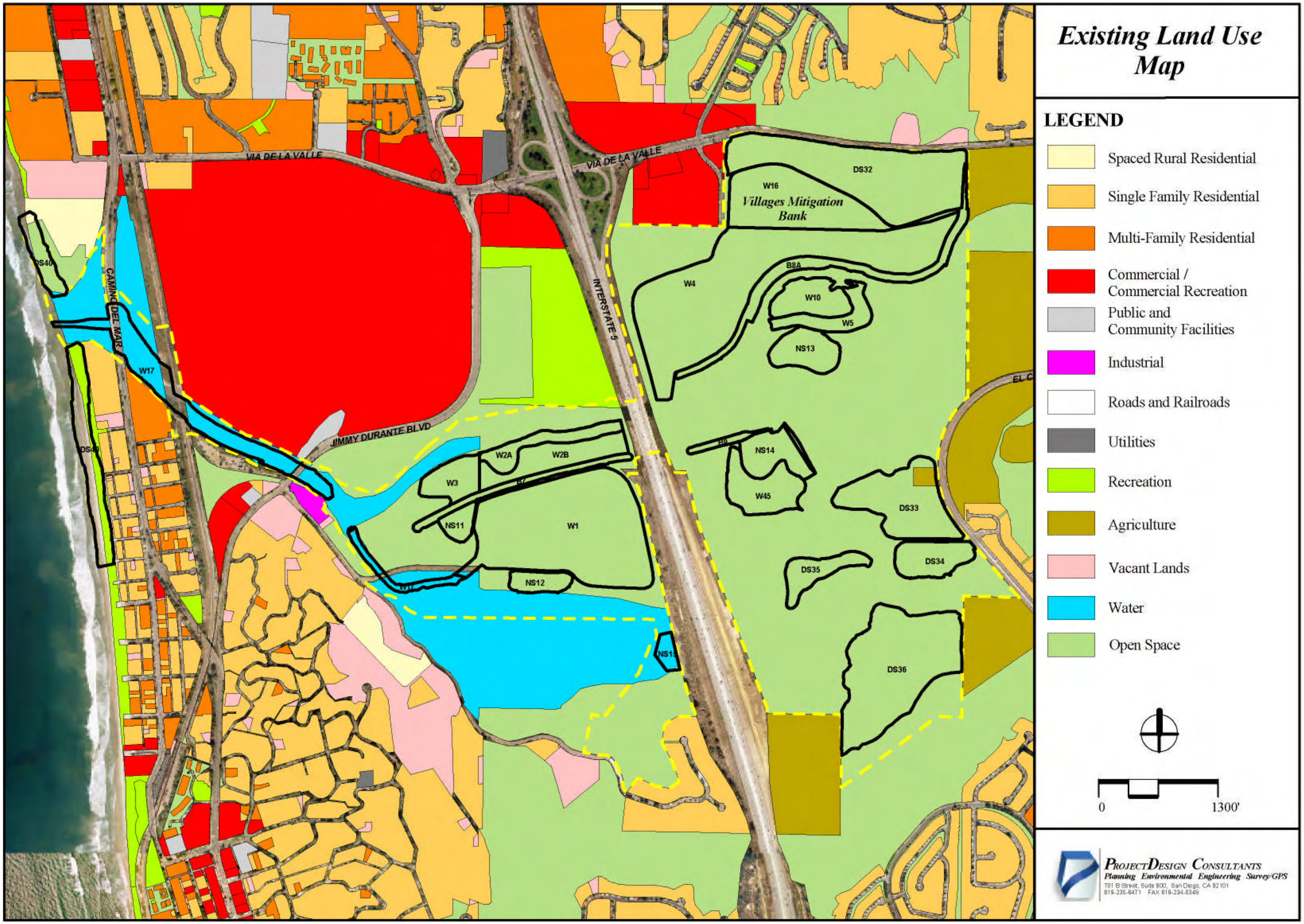


Figure 2.1. Existing Land Use Map

~~Within the project boundary, active agriculture (e.g., tomatoes) is primarily located on the northern and eastern portions of the project area. A 0.03-acre parcel of land classified as Farmland of Statewide Importance overlaps a portion of the eastern part of the site and extends east and south of the site. Additionally, a 43-acre parcel of Prime Farmland is located in the northeastern portion of the site just south of Via de la Valle; it adjoins 152 acres of land classified as Farmland of Local Importance.~~

~~Open water areas consist of the San Dieguito Lagoon and River. Recreation and open space areas located on the northeast portions of the project area include a horsepark/equestrian center operated by the 22nd District Agricultural Association. About 170 horses are stabled at this facility, which also provides a practice ring and covered arena. The Rancho Santa Fe Polo Club is located east of this area.~~

Single-family residential homes on beachfront property are located immediately south of the river mouth. Condominiums are located off Camino Del Mar adjacent to the river. Other residential uses include homes in the Racetrack View Drive area.

Regional access to the project area is provided by Interstate 5 (I-5), which bisects the site. Via de la Valle, a major east-west arterial roadway intersecting I-5, forms the northern boundary of the site and provides local access to coastal areas, shopping, restaurant, and residential areas, and the Del Mar Racetrack/Del Mar Fairgrounds. The NCTD Railroad crosses through the western portion of the site. Railroad uses include commuter rail, freight, and long-distance passenger service. Five bridges cross the San Dieguito River within the project site. From west to east, they include Camino Del Mar (U.S. Highway 101), the AT&SF Railroad, Jimmy Durante Boulevard, Grand Avenue, and I-5. El Camino Real borders the eastern portions of the site. No structures remain on the site of an abandoned airport west of I-5. The City of Del Mar operates a public works yard east of the railroad and south of the river. An existing forced-main sewer line crosses the river, generally along the river bottom, from a pump station located on the fairgrounds to the Del Mar public works yard. Utility power line easements cross portions of the project area.

Existing land uses adjacent to the project area include public recreation, retail/commercial, commercial recreation, residential, agricultural, and vacant areas. The Scripps Preserve, a pedestrian overlook, is located on the ocean bluffs north of the river overlooking the river mouth. Other adjacent land uses include a hotel, driving range (Surf and Turf), and a mini golf center, located north of the river on the west side of I-5 (southwest quadrant of the I-5/Via de la Valle intersection). A community commercial center, which includes a grocery store and other supporting uses, is located in the southeast quadrant of the same intersection. South of the project area, existing land uses include protected hillsides, residential uses, and vacant areas. On the east, adjacent land uses include agricultural and vacant lands as well as newly constructed residential uses. The Del Mar Racetrack/Del Mar Fairgrounds are located along the northwest edge of the proposed project work area(Work area is shown by yellow dashed line of Figure 2.1). The Del Mar Racetrack/Del Mar Fairgrounds are operated by the 22nd District Agricultural Association. The racetrack has a seven-week racing season (from the third week of July to the first week of September), and the Del Mar Fair operates for 20 days during the middle of June and early July. Approximately 200 other non-fair activities such as concerts, music festivals, and sporting events draw large crowds and are scheduled throughout the remainder of the year at the fairgrounds. While visitor use of the fairgrounds and racetrack do not directly affect the river, lagoon, and beach area, increases in vehicular traffic, parking, and pedestrian crossings occur when the fairgrounds are in use. Bordering the northeast portions of the project is a horsepark/equestrian center operated by the 22nd District Agricultural Association. About 170 horses are stabled at this facility, which also provides a practice ring and covered arena. The Rancho Santa Fe Polo Club is located east of this area.

2.2 PROPERTY OWNERSHIP

The project area is located in the San Dieguito River Valley within the City of Del Mar (Del Mar) and the northern portion of the City of San Diego (San Diego), adjoining the Pacific Ocean shoreline. Land ownership is illustrated in Figure 2.2 and a breakdown of land area by owner is listed in Table 2.2. Owners in the project area include the SCE, JPA, San Diego, 22nd District Agricultural Association (DAA), California Department of Fish and Game (CDFG), Del Mar, North County Transit District (NCTD), State Lands Commission (SLC), and several private owners.

Table 2.2. Property Ownership within the Project Boundary

Property Owner	*Area (acres)*
Southern California Edison Company	142.23
Joint Powers Authority	194.64
San Diego	216.87
22nd District Agricultural Association	41.55
California Department of Fish and Game	38.26
Del Mar	11.4
North County Transit District	5.4

Note: Calculations in Table 2.2 are approximations.

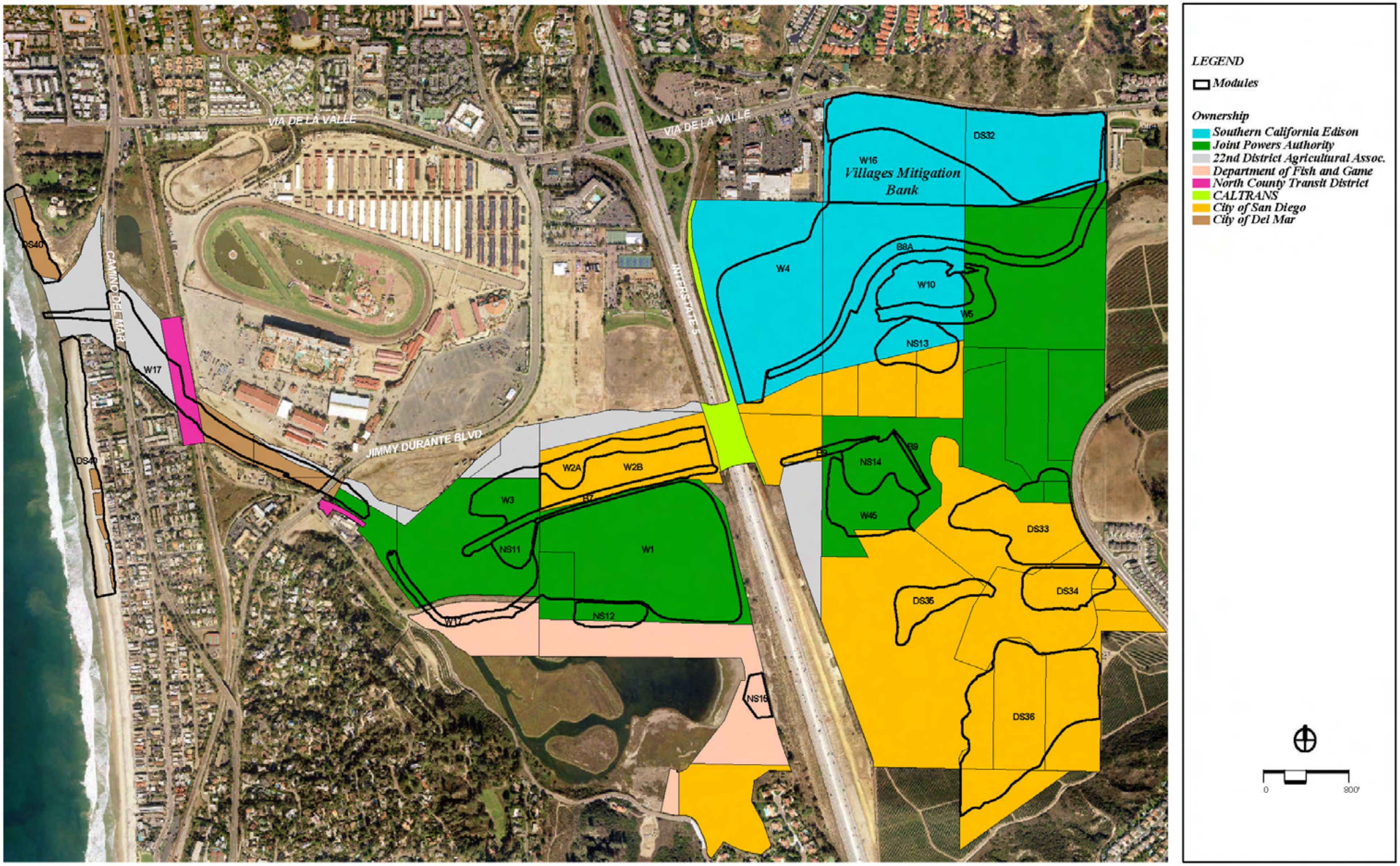


Figure 2.2. Property Ownership Map

2.3 REGULATION

A number of federal, state, and local agencies have jurisdiction over activities within the San Dieguito Lagoon project area. Several of these agencies also own or control land within the project area.

The San Dieguito Lagoon area contains "water of the United States" subject to regulation under the Clean Water Act. A jurisdictional delineation by MEC in 1993 (MEC 1993)~~ and then updated by Wetlands Research Associates (WRA) in 1997 (Josselyn 1997)~~ and in 2004 (Josselyn 2004) determined that the San Dieguito Lagoon area contains approximately ~~260~~ 183.5 acres of "waters of the United States" subject to regulation under section 404 of the Clean Water Act (EPA1989). The majority of the "waters of the United States" at San Dieguito Lagoon are also "special aquatic sites" as defined in EPA's 404(b)(1) Guidelines. These "special aquatic sites" at San Dieguito Lagoon include wetlands, mudflats, vegetated shallows, and sanctuaries and refuges. Activities proposed within portions of the Proposed Project area will require federal permits issued by the Corps pursuant to Section 404 of the Clean Water Act, 33 U.S.C. Section 1344, and Section 10 of the River and Harbors Act of 1899, 33 U.S.C. Section 403.

Prior to obtaining a Section 404 permit, a Section 401 Water Quality Certification will be required. The San Diego Regional Water Quality Control Board (RWQCB) will issue this certification. Through the certification review process, the RWQCB is expected to require a NPDES permit for the disposal of dredged/excavated material on land and to control any water quality impacts from the dredging/excavation construction activities. In addition, the RWQCB will require project coverage under the State's General NPDES permit for stormwater runoff for construction activities. This permit ensures that construction activities do not adversely impact water quality.

In accordance with federal objectives relative to cooperation and coordination with other agencies for major permitting activities, the Corps must consult with the USFWS pursuant to the requirements of Section 7 of the Endangered Species Act, 19 U.S.C. Sections 1531-1544 regarding threatened or endangered species that occur or potentially occur at San Dieguito Lagoon. ~~If the federal agencies determine that a federally listed species may be adversely affected, formal Section 7 consultation will be initiated. Formal Section 7 consultation will conclude with a Biological Opinion. The Corps will consult with the USFWS, NMFS, and the CDFG in accordance with the provisions of the Fish and Wildlife Coordination Act, 16 U.S.C. Sections 661-666(C).~~The USFWS, during informal consultation in accordance with Section 7 of the Endangered Species Act, concluded that the Project would not adversely affect the western snow plover, Californi least tern, brown pelican or light-footed clapper rail. No impacts to any listed species were anticipated due to the absence of listed species from the Project area and construction timing and protective measures implemented as part of the Proposed Project. Therefore, formal consultation and a resultant Biological Opinion were not necessary.

The USACE also must consider potential impacts to prehistoric or historic resources under Section 106 of the National Historic Preservation Act (NHPA0 of 1966, as amended (as defined in 36 CFR 60 and 36 CFR 800). Under this Act, the USACE is required to consult with the State Historic Preservation Office (SHPO) to ensure that no impacts would occur to National Register eligible sites and, if impacts do occur, that they will be mitigated.

A permit also may be required from ~~the Department of Transportation (DOT) and~~ the Coast Guard (USCG) pursuant to the Bridge Act, 33U.S.C. Section 491 *et seq.*, for modifications to Camino Del Mar in order to construct a non-navigable tidal inlet across San Dieguito Lagoon State Beach, as shown in the federal permit application.

The California Coastal Commission maintains jurisdiction for the entire coastal zone and the project site is located within the coastal zone. The CCC will review the project for consistency with the California Coastal Act and issue a Coastal Development Permit with special conditions as needed to assure consistency with the Coastal Act.

The California Department of Fish and Game (CDFG) owns property within the western San Dieguito River Valley in the existing lagoon located west of Interstate 5 and south of the San Dieguito River channel. CDFG also is responsible for regulating activities that may have an effect on state-listed species such as the Belding's savannah sparrow. CDFG will require a Stream Entry Agreement per Section 1600 of the State Fish and Game Code to ensure that construction activities within the lagoon are conducted in a manner that is protective of fish and wildlife resources.

The California State Lands Commission (SLC) is responsible for all property owned and managed by various state agencies such as the California Department of Fish and Game and Caltrans. In addition, the SLC maintains jurisdiction of coastal lands up to the mean high tide line and is responsible for the management of leased coastal property. Caltrans will require an encroachment agreement for any construction activities within its right-of-way along Interstate 5.

2.4 PHYSICAL

2.4.1 Geology/Soils

The grain size and chemical characteristics of sediments and soils within the San Dieguito project area reflect the properties of the source materials within the watershed and effects of alterations such as dredging and construction. Sediment quality will reflect the recent as well as historical contaminant inputs. Historical discharges from the sewage treatment plant to the lagoon, accidental spills or releases associated with operations at the airfield, and watershed inputs, including runoff of pesticides and fertilizers from agricultural sites, are potential sources of contaminants to the lagoon. Distributions of chemical contaminants also reflect the grain size patterns because finer grained sediments typically have a greater affinity for contaminants than coarser grained materials.

2.4.1.1 Seismicity

The San Dieguito Lagoon is located in a seismically active area where strong ground shaking can be expected. Although no active faults underlie the lagoon, earthquake-induced ground failure is possible within on-site sediments. The San Dieguito Lagoon is located within the regional influence of several active and potentially active faults. Earthquakes originating within 60 miles of the site are capable of generating significant ground shaking. Figure 2.3 shows the relationships to the project site of several faults capable of producing this type of shaking. The active Rose Canyon/Newport-Inglewood fault zone, located approximately three miles west of the lagoon, is considered the source of potentially the most severe earthquake-induced effects and has an assigned maximum earthquake moment magnitude (M_W) of 6.9 (California Division of Mines and Geology [CDMG, 1998]). Based on a Probabilistic Seismic Hazard Assessment for the Western United States, issued by the United States Geological Survey (2002), the project site is located in a zone where the horizontal peak ground acceleration having a 10 percent probability of exceedance in 50 years is 0.33g (33 percent of the acceleration of gravity).

No active fault traces are known to lie beneath the site, therefore, surface fault rupture is very unlikely. However, numerous northeast-striking faults apparently offsetting deposits of Quaternary age (approximately 2 million years and younger), but not necessarily Holocene age (11,000 years and younger), have been mapped in the higher ground along the coast north and south of the San Dieguito Lagoon (Kern 1987). Quaternary age faults are considered potentially active whereas Holocene faults are considered active. Similar potentially active faults may be concealed beneath the more recent sediments in the Lagoon, however, the probability of fault rupture occurring on one of these faults is very low (M&T AGRA, Inc. 1993a; Ninyo & Moore 1999, 2004).

Liquefaction of cohesionless soils can be caused by strong earthquake-induced ground motion. Research and historical data indicate that loose granular soils (with silt contents less than approximately 35 percent and clay contents less than approximately 20 percent) that are saturated by a relatively shallow groundwater table are most susceptible to liquefaction. Due to the presence of a shallow groundwater table and relatively loose granular soils at the site, the potential for liquefaction is considered high. Sediment most likely to liquefy in the event of an earthquake would be within the upper 25-foot layer. Liquefaction could induce approximately 2 to 7 inches of settlement at the site. Effects of liquefaction would be highly variable across the site. In addition, lateral spreading (horizontal movement of soils) of on-site materials (in existing conditions) up to 1 foot is possible in the event of a large seismic event (Ninyo & Moore 1998a, 1998b, 1999, 2004).

2.4.1.2 Soils/Stratigraphy

The San Dieguito Lagoon forms the lowest reaches of an incised valley (San Dieguito River valley) now backfilled with sediment. The sediments filling this portion of the valley consist of a thin upper unit of relatively recent alluvium, overlying older, thicker accumulations of alluvial and nearshore marine sediments. In addition, areas of artificial fill are present in the vicinity of the former Del Mar Airport, the bridge abutments, and roadways (M&T AGRA, Inc. 1993a; MEC Analytical Systems 1992; Ninyo & Moore 1998a, 1998b, 2004). Ogden (1999) divided the proposed footprint of dredging and excavation into three areas: (1) the Lagoon Area, located west of Interstate 5 (I-5) and south of the San Dieguito River (also known as the Airfield Property); (2) Horseworld, located east of I-5 and north of the San Dieguito River; and (3) South Wetlands, located east of I-5 and south of the San Dieguito River. The following is a description of sediments in these and other areas of the proposed lagoon restoration project. A generalized soils map is shown in Figure 2.4 and typical lagoon soils cross-sections are shown in Figures 2.5 and 2.6. The grain size distributions of soils within the project site are summarized in Table 2.3

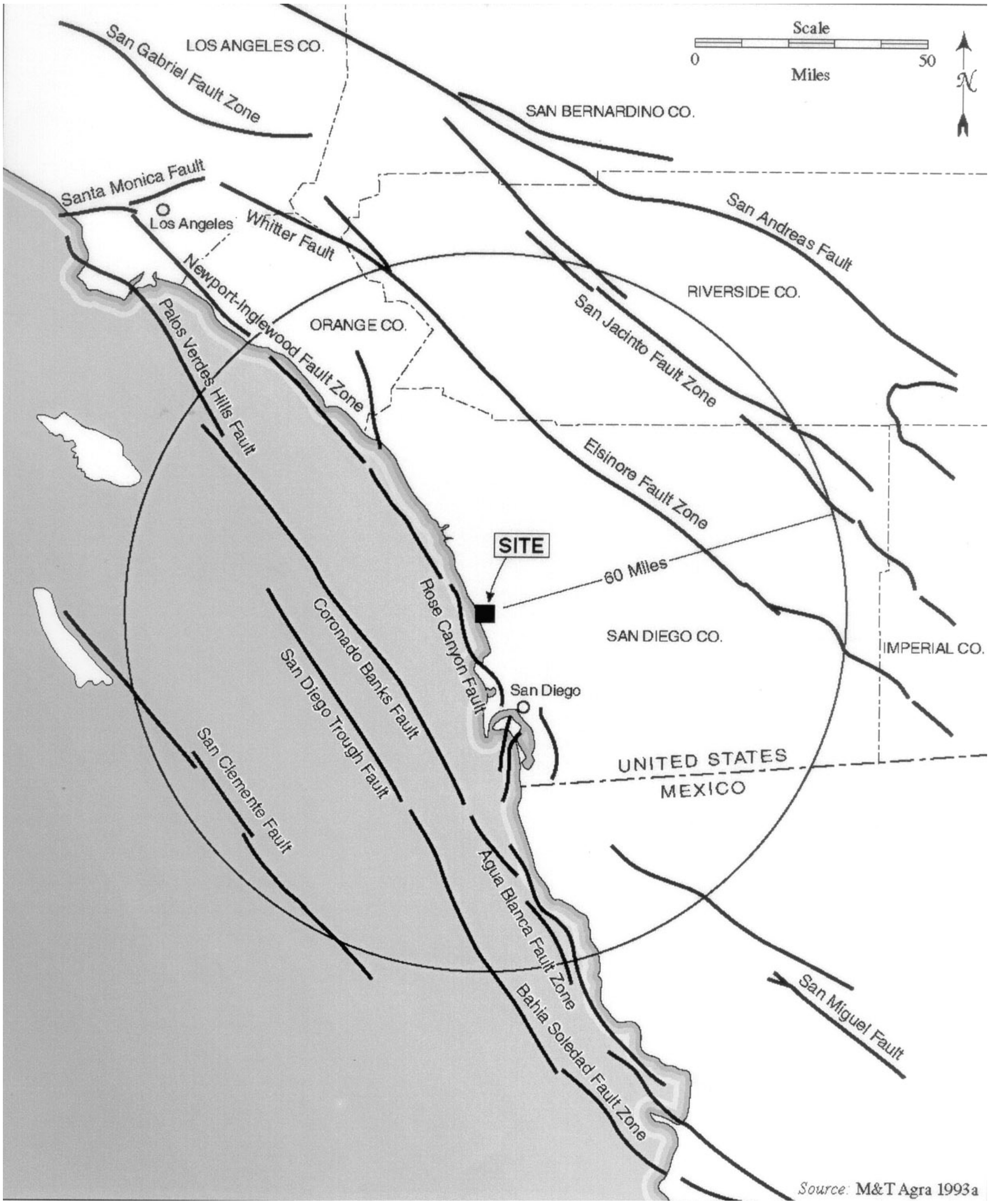


Figure 2.3. Regional Fault Map

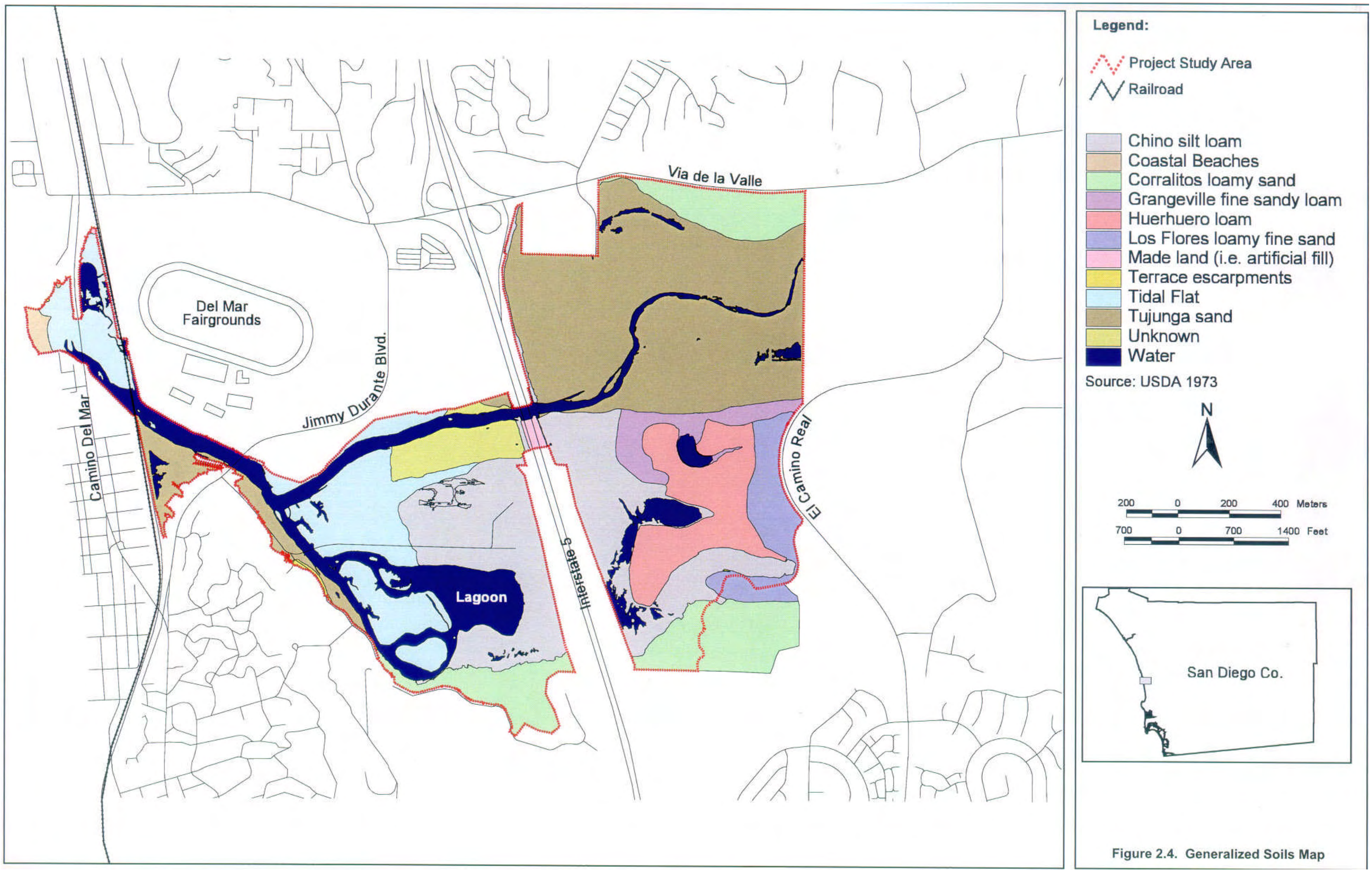


Figure 2.4. Generalized Soils Map

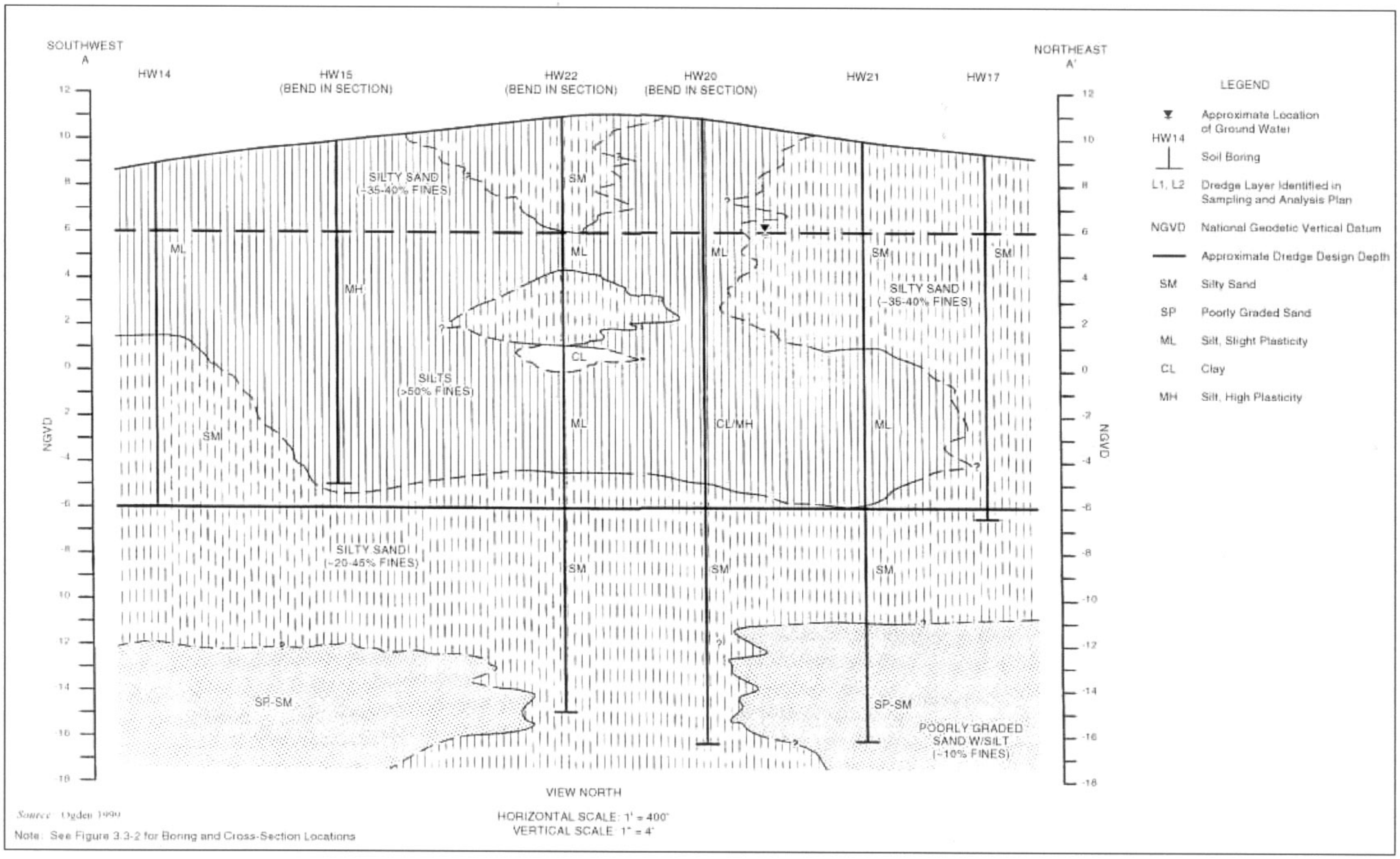


Figure 2.5. Geological Cross-Section A-A

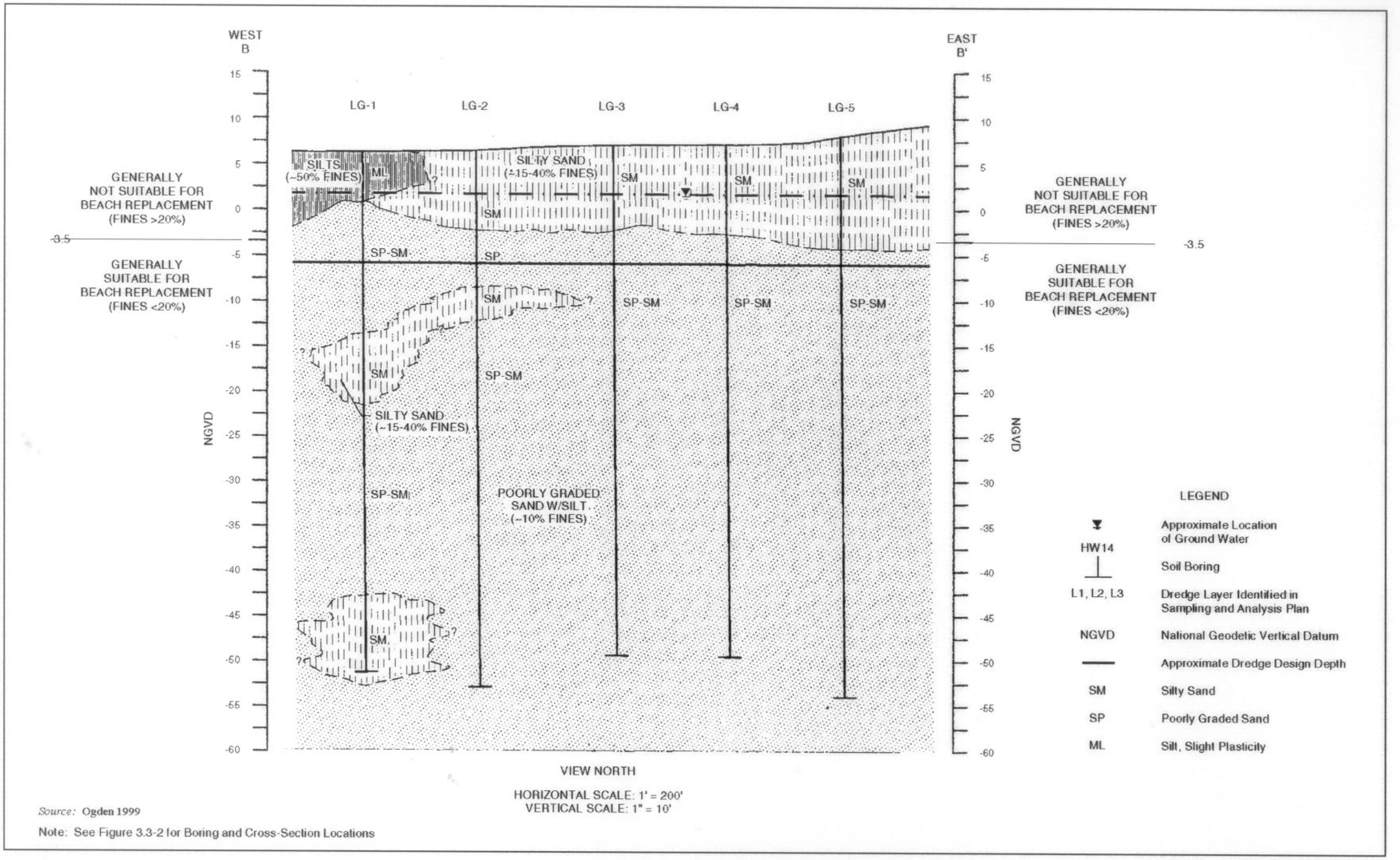


Figure 2.6. Geological Cross-Section B-B

Table 2.3. Grain Size Distributions of Soils within the Project Site

Sample Identification	*Depth (ft-BGS)*	*Soil Type*	*Percent Gravel (>2mm)*	*Percent Sand (>0.075mm)*	*Percent Fines (<0.075mm)*
0-10 feet					
LG-1	0-4	ML	1	48	51
LG-1	5-7	SP-SM	0	91	9
LG-2	0-4	ML	2	48	50
LG-2	6-8	SM	0	73	27
LG-3	0-4	SM	0	50	50
LG-4	0-4	SM	0	60	40
LG-5	0-4	SM	1	60	39
LG-5	4-5	ML	0	30	70
LG-6	0-4	SM	0	55	45
LG-6	4-6	SM	0	80	20
LG-7	0-4	ML	0	50	50
LG-7	4-6	SM	1	59	40
LG-8	0-4	ML	0	45	55
LG-8	4-6	ML	0	44	56
LG-9	0-4	ML	0	48	52
LG-9	4-6	ML	0	48	52
LG-9	8-10	SP-SM	0	91	9
LG-10	0-4	SM	4	54	42
LG-10	4-6	SP-SM	2	83	15
LG-10	8-10	SP-SM	0	90	10
Average			**0.6**	**60.4**	**39.1**
10-20 feet					
LG-2	10-12	SP	0	96	4
LG-2	15-17	SM-SP	1	84	15
LG-3	10-12	SP	5	90	5
LG-4	15-17	SP	0	95	5
LG-5	10-12	SM	0	82	18
LG-6	10-12	SP-SM	5	83	12
LG-7	10-12	SP-SM	0	91	9
LG-8	10-12	SM	0	80	20
LG-8	15-17	SP-SM	0	90	10
LG-9	14-16	SP-SM	1	91	8
LG-10	15-17	SP-SM	2	92	6
Average			**1.3**	**88.5**	**10.2**

(Table cont. next page)

Table 2.3. Grain Size Distributions for Soils within the Project Site (cont'd)

Sample Identification	*Depth (ft-BGS)*	*Soil Type*	*Percent Gravel (>2mm)*	*Percent Sand (>0.075mm)*	*Percent Fines (<0.075mm)*
20-52 feet					
LG-1	20-22	SM	0	72	28
LG-1	28-30	SP-SM	0	89	11
LG-1	45-47	SP-SM	0	92	8
LG-2	30-31	SP-SM	2	90	8
LG-3	35-37	SM-SP	5	83	12
LG-3	45-47	SP-SM	0	92	8
LG-4	20-22	SM-SP	0	94	6
LG-5	20-22	SP-SM	0	92	8
LG-5	35-37	SP-SM	0	91	9
LG-5	50-52	SP-SM	2	88	10
LG-6	40-42	SP	4	92	4
LG-8	45-47	SP-SM	2	92	6
LG-10	45-47	SP-SM	1	90	9
Average			**1.2**	**89.0**	**9.8**
HW-14	0-4	ML	0	49	51
HW-14	9-10.5	SM	0	74	26
HW-15	0-4	ML	0	43	57
HW-15	9-10.5	ML	1	17	82
HW-16	0-4	SM	0	55	45
HW-17	0-4	SM	0	53	47
HW-18	0-4	SP-SM	1	87	12
HW-18	4-6	SP-SM	1	89	10
HW-19	0-4	SM	1	87	12
HW-19	20-21.5	ML	2	43	55
HW-20	0-4	ML	0	50	50
HW-20	9-10.5	ML	0	35	65
HW-20	20-22	SM	0	70	30
HW-21	0-4	SM	1	54	45
HW-21	9-10.5	ML	0	20	80
HW-21	20-22	SP-SM	15	77	8
HW-21	25-26.5	SP	0	96	4
HW-22	0-4	SM	1	57	42
HW-22	9-10.5	CL	0	20	80
HW-22	20-22	SM	2	76	22
Average			**1.3**	**57.6**	**41.2**
SW-11	0-4	ML	1	47	52
SW-11	4-6	ML	0	22	78
SW-12	0-4	SM	1	57	42
SW-12	8-10	SM	5	75	20
SW-13	0-4	SM	6	65	29
SW-13	7-15	ML	0	42	58
Average			**2.2**	**51.3**	**46.5**
CH-26	3-4.5	ML	0	18	82
CH-26	4.5-6	SM	0	84	16
Average			**0.0**	**51.0**	**49.0**

Source: Ogden 1999

Surficial Soil Deposits

Surficial soils in the vicinity of the lagoon consist primarily of sand, silt loam, and tidal flats (clay to very fine sand range), with lesser amounts of fine loamy sand, loamy sand, and loam. In addition, man-made land (i.e., artificial fill), coastal beach gravel and sand, and terrace escarpments are present (USDA 1973).

Recent Alluvium

The recent alluvium consists predominantly of soft, sandy to clayey silts with lesser amounts of sands, clays and loose, fine silty sands, to a depth of approximately 15 to 20 feet below ground surface.

Channel Sands

In contrast to the fine-grained recent alluvial deposits, the active river channels and point bars are underlain by relatively clean, fine- to medium-grained sands, up to five feet in thickness, with local silt and clay layers. These deposits are present primarily between the ocean and Jimmy Durante Boulevard.

Older Alluvium

Clean fine sands and silty sands, interpreted to be alluvial materials which have been reworked in the nearshore marine environment, underlie the recent alluvium, beneath a depth of 10 feet below ground surface. These older alluvial sands contain beds with abundant clam and oyster shell fragments and are distinctly more compact than the overlying, younger deposits. In the seaward portions of the site (i.e., in the vicinity of Camino Del Mar and the railroad bridges), the older alluvial/marine sands generally consist of clean sands and are very dense below elevation –10 to –25 feet NGVD. Older alluvial sediments in the Lagoon Area consist of clean sands from a depth of 10 to 52 feet below ground surface. Older alluvial sediments east of I-5 (i.e., the Horseworld and South Wetlands areas) generally consist of silty sands, which are finer grained than those sediments located west of I-5 (Ninyo & Moore 1998a, 1998b, 2004; Ogden 1999).

These dark-colored, semi-cohesive silts are appreciably different in appearance, grain size, and consistency compared with typical North County beach sands. These deposits generally decrease in grain size with distance from the ocean. In the eastern portion of the site, in the vicinity of Horseworld and the South Wetlands, silts and silty sands, with interbedded clays, comprise the bulk of the material. To the west, in the vicinity of the Lagoon Area, fine silty sands and fine sands are more pervasive and locally comprise the bulk of the material. In the Lagoon Area, fine-grained sands are present below a depth of 3 to 7 feet. These fine-grained sediments are interpreted to be overbank deposits laid down by waning flood waters (M&T AGRA, Inc. 1993a; MEC Analytical Systems 1992; Coastal Environments 1993; Ogden 1999; Ninyo & Moore 1999, 2004).

The contact between the older and more recent alluvium is an irregular, apparently erosional surface generally between elevation –2 and –10 feet NGVD (M&T AGRA, Inc. 1993a). Deep borings drilled in the western portion of the lagoon indicate the older alluvial materials are underlain by sedimentary bedrock at a depth in excess of 70 feet (San Diego Soils and Engineering 1983; Tetra Tech 1991). Similarly, deep borings drilled in the eastern portion of the lagoon, in the vicinity of the El Camino Real widening project, indicate alluvium is present at depths in excess of 111 feet. Alluvial deposits in this area consist primarily of very loose to dense, silty to clayey sand and fine sand, and very soft to firm, silty clay to clayey silt (Ninyo & Moore 1998a, 1998b, 2004).

Artificial Fill Deposits

The fill materials located in the vicinity of the former airfield consist of silts, silty sands, and clay, presumably of local derivation. Fill is present in this area to a maximum depth of approximately +3 NGVD (Ninyo & Moore 1999, 2004). Fill material present in the vicinity of the El Camino Real widening project consists of very loose to medium dense, silty and clayey sand, and firm sandy clay, to a depth of 2 to 13 feet (Ninyo & Moore 1998a, 1998b).

Marine Sediments

U.S. Navy (1995) evaluated the grain size and chemical characteristics of intertidal and subtidal sediments off Del Mar. Sediments collected at depths of 10 feet, 20 feet, and 30 feet off the Del Mar Beach consisted entirely of sand-sized particles.

2.4.1.3 Soil/Sediment Contamination

Airfield Property

The Naval Auxiliary Air Station was investigated in 1997 as a Formerly Used Defense Site (FUDS) under the Defense Environmental Restoration Program (DERP) administered in Southern California by the U.S. Army Corps of Engineers, Los Angeles District. Under that program the site is identified as Navy Dirigible Base, Site Number J09CA723700. The 1997 investigation resulted in an Inventory Project Report (INPR), dated 5 February 1998, which describes an Ordnance and Explosive Waste (OEW) project with a risk assessment code (RAC) score of 2 as detailed by the associated RAC form. On a RAC scale of 1 to 5, with 1 having the highest priority and 5 indicating no further action, a RAC score of 2 affords the site high priority with the recommendation of further action by OEW experts based in the Huntsville Division of the Corps of Engineers. However, the "Justification " sheet attached to the RAC form recommends a RAC score of 4 because the site does not appear to present a significant risk. This conclusion is based on the following: A decontamination certificate (for OEW) was submitted to the War Assets Administration circa 1946 indicating there was no on-site bombing practice, the site was used as a municipal airport by the County of San Diego from 1947 to 1959, and the lack of any record of ordnance discovery for the site. Following review of the INPR and review of all pertinent historical records for the site, the Huntsville Division recommended a RAC score of 5, indicating no further action regarding OEW issues. Therefore, no impacts from this site are anticipated.

Based on historical uses of the project area (sections 3.2 and 3.10), some potential exists for uncovering hazardous wastes and/or munitions during excavation within the proposed project area, which could cause a significant but mitigable impact to public safety (Class II). However, based on research conducted by U.S. Army Corps of Engineers with respect to hazards associated with the presence of munitions or ordnance during military use of the site (section 3.10.5), indicates that the risk is low enough that no further action is planned or recommended by the Corps of Engineers at this time (Attachment B).

Notwithstanding, to provide additional safety measures, project construction activities at the site would follow standard U.S Army Corps of Engineers protocols as specified in "Procedures for Conducting Preliminary Assessments at Potential Ordnance Response Sites" (Department of the Army, U.S. Army Corps of Engineers, ETL 1110-1-165, 1995).

A Phase II Environmental Site Assessment (MEC Analytical Systems 1992) was completed at the airfield property to delineate potential areas of subsurface contamination, as determined by the Phase I report. The Phase II report indicated that no significant amounts of organic lead, total petroleum hydrocarbons (TPH), total recoverable petroleum hydrocarbons (TRPH), metals, pesticides, polychlorinated biphenyls (PCBs), or polychlorinated aromatic hydrocarbons (PAHs) were found in on-site soils (see Figure 2.7; Tables 2.5, 2.6, and 2.7). Soil samples were not collected in the vicinity of the former ammunition bunkers due to safety concerns.

Testing of the abandoned airfield ~~has been scheduled~~was completed in ~~August~~ October 2004 so as not to interfere with breeding of the Belding savannah sparrow. Earth Tech recorded geophysical and GPS data between October 18 and 22, 2004. The data were collected on 8.5 acres, as defined during a site visit on September 24, at the San Dieguito Wetlands Restoration Project former airfield site. Fifty anomalous locations were intrusively investigated October 27. No evidence of burial of any kind of military munitions (ordnance) or munitions-related materials was found. The discovered items were exclusively debris from destruction of buildings and/or other concrete structures and miscellaneous metal debris. An additional 21 anomalies were investigated November 11th. As before, only construction and miscellaneous refuse was discovered. It was recommended by Earth Tech that no further intrusive investigations for military munitions materials (ordnance or other components/debris) was warranted. It was suggested that an on-call (response same or next day) UXO technician, be available to the wetlands restoration project should any suspicious or unknown items be uncovered during the further development of the wetlands.

Horseworld, Southern Wetlands, and Lagoon Areas

Chemical characteristics of lagoon sediments and soils are based on information from a recent investigation by Ogden (1999) and a regional sediment quality study that included one sampling site within the South Channel area (Anderson et al. 1998) (Figure 2.8).

The Ogden (1999) study measured the chemical properties of soils from discrete layers within borings collected at several locations within each of the Horseworld, Southern Wetlands, and Lagoon areas. Ranges in values for primary and trace constituents are summarized in Table 2.7 In general, the results indicate that both near-surface and subsurface soils have a low organic content with undetectable sulfides and neutral acidity/alkalinity conditions. Further, the soils are uniformly devoid of chemical contaminants, with the exception of detectable concentrations (0.27 mg/kg) of the pesticide derivative DDE in the surface layer of sediments from one of the Horseworld locations. Because DDE was not detected in the subsurface sediments from this location, or in surface or subsurface

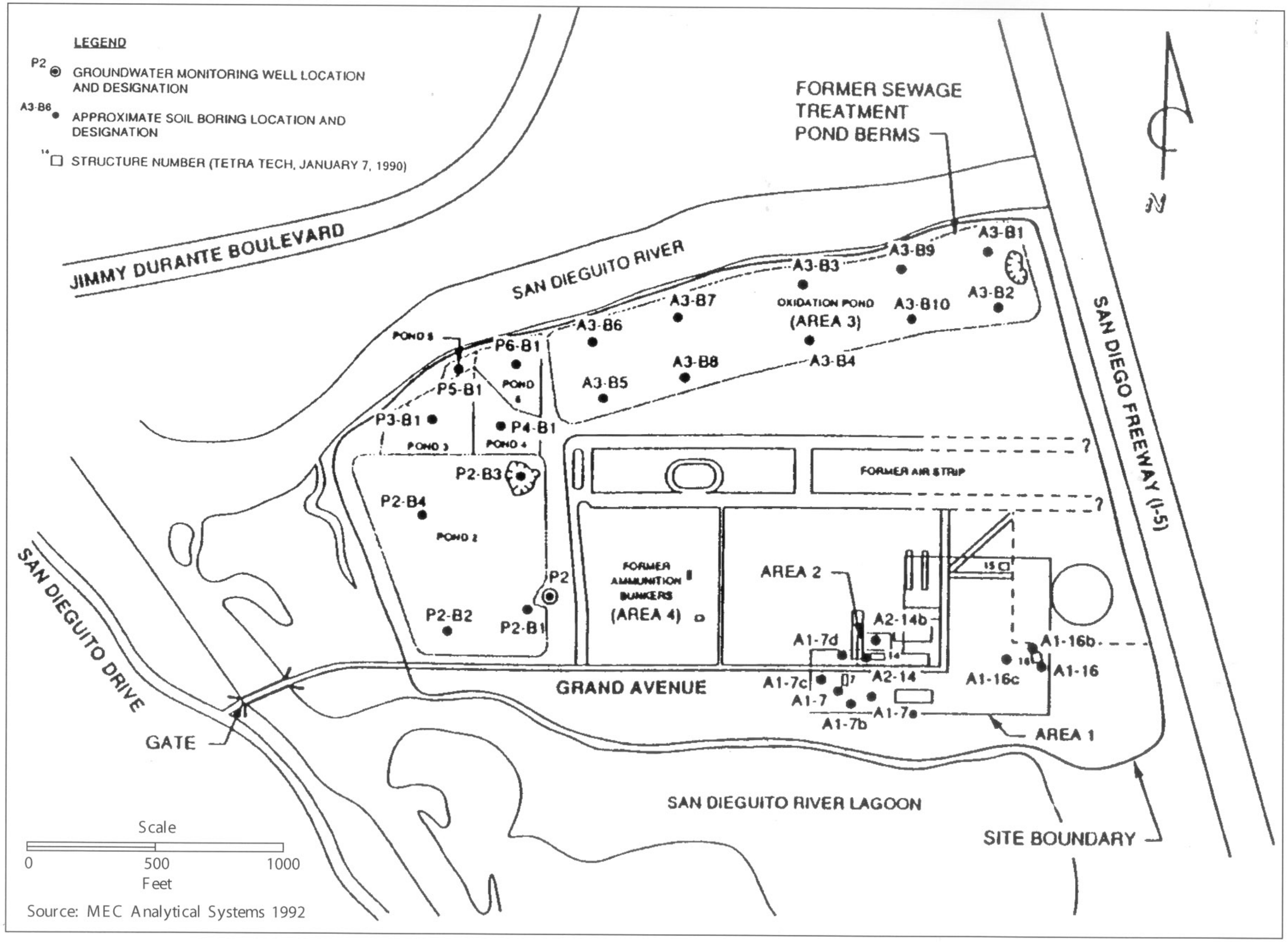


Figure 2.7. Airfield Property Soil Sampling Locations (MEC 1991 Study)

Table 2.4. Chemical Characterization of Soils on the Airfield Property (Areas 1 & 2)

Structure	***7***						***16***					
Core Location	***A1-7***	***A1-7***	***A1-7B***	***A1-7C***	***A1-7D***	***A1-7E***	***A1-16***	***A1-16***	***A1-16B***	***A1-16B***	***A1-16C***	***A1-16C***
	(6.5')	(9.5')	(3.5')	(4.5')	(4.0')	(3.0')	(Surf)	(4.5')	(Surf)	(6.0')	(Surf)	(6.0')
Organic Lead (mg/kg)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPH (mg/kg)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	5250	<10.0
TRPH (mg/kg)	6.3	6.3	9.5	7.9	7.9	7.9	50.6	7.9	19.7	12.8	9020	12.8
Benzene (μg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene (μg/kg)	<1.0	<1.0	<1.0	<1.0	15.9	64.6	14.0	109	<1.0	<1.0	12.6	36.0
Ethylbenzene (μg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylene (μg/kg	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Structure	***14***		
Core Location	***A2-14***	***A2-14B***	***A2-14B***
	(4.5')	(Surf)	(4.5')
Organic Lead (mg/kg)	<0.5	<0.5	<0.5
TPH (mg/kg)	<10.0	<10.0	<10.0
TRPH (mg/kg)	6.3	6.3	6.3
Benzene (μg/kg)	1.9	2.2	<1.0
Toluene (μg/kg)	70.5	80.0	84.1
Ethylbenzene (μg/kg)	<1.0	19.4	29
Xylene (μg/kg)	<3.0	43.5	111

Note: See Figure 2.7 for sampling locations.
Source: MEC Analytical Systems 1992

Table 2.5. Chemical Characterization of Soils on the Airfield Property (Oxidation Pond)

Structure	***Oxidation Pond***									
Core Location	***A3-B1***	***A3-B2***	***A3-B3***	***A3-B4***	***A3-B5***	***A3-B6***	***A3-B7***	***A3-B8***	***A3-B9***	***A3-B10***
Antimony (1)	2.77	2.70	3.58	3.82	2.08	2.10	2.72	1.90	2.06	3.10
Arsenic	1.3	0.805	1.58	1.89	0.984	1.46	1.39	0.934	1.07	<0.941
Barium	149.0	79.9	189	193	102	196	162	142	165	148
Beryllium	0.3	0.046	0.297	0.368	0.192	0.299	0.279	0.218	0.320	0.301
Cadmium	<0.158	1.36	<0.157	<0.157	<0.160	0.504	<0.152	<0.146	<0.157	<0.151
Chromium	21.6	378	26.9	28.0	19.8	22.9	22.7	19.0	21.3	22.4
Cobalt	10.9	0.506	13.7	15.2	7.95	11.1	11.2	9.33	10.9	12.0
Copper	24.4	122	30.8	36.4	9.36	56.8	37.2	29.8	31.0	39.3
Lead	6.82	16.3	8.20	8.80	5.96	15.1	7.12	7.39	6.09	6.29
Mercury	<0.018	<0.019	<0.020	<0.018	<0.018	0.268	<0.018	0.025	<0.020	<0.019
Molybdenum	<0.098	0.624	<0.098	<0.098	<0.100	<0.090	<0.095	<0.091	<0.098	<0.094
Nickel	8.40	194	10.0	11.1	7.06	8.70	9.14	7.07	8.22	8.68
Selenium	2.76	2.53	5.55	2.44	3.93	2.33	6.32	<0.913	4.55	4.37
Silver	<0.079	<0.078	<0.078	<0.078	<0.080	0.368	<0.076	0.320	<0.078	<0.075
Thallium	19.0	6.18	26.7	30.9	16.1	22.6	25.2	17.6	24.7	23.5
Vanadium	60.3	8.63	73.8	86.7	46.7	60.1	59.5	53.0	52.7	62.0
Zinc	49.0	90.0	58.5	66.8	31.8	100	60.2	48.6	53.8	71.7
Toluene (µg/kg)	ND	5.00	50.0	ND	10.0	ND	38.0	48.0	9.00	ND
Pesticides (µg/kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total PAHs (µg/kg)	ND	ND	ND	ND	ND	ND	ND	ND	ND	

Notes: 1. All metal values are in mg/kg
PAH-Polychlorinated aromatic hydrocarbons
See Figure 2.7 for sampling locations.
Source: MEC Analytical Systems 1992

Table 2.6. Chemical Characterization of Soils on the Airfield Property (Ponds 2 - 6)

Structure	***Pond 2***				***Pond 3***	***Pond 4***	***Pond 5***	***Pond 6***
Core Location	***P2-B1***	***P2-B2***	***P2-B3***	***P2-B4***	***P3-B1***	***P4-B1***	***P5-B1***	***P6-B1***
Antimony (1)	<1.86	<2.07	<1.95	<1.86	<1.95	<1.90	<1.94	<1.78
Arsenic	26.7	33.1	17.0	14.4	31.0	27.2	24.7	34.3
Barium	204	208	132	99.0	165	168	170	188
Beryllium	0.864	0.885	0.597	0.502	0.804	0.805	0.709	0.850
Cadmium	<0.297	<0.331	<0.312	<0.297	<0.312	<0.304	<0.310	<0.285
Chromium	23.2	23.3	14.6	12.8	19.9	18.6	16.9	21.4
Cobalt	13.9	13.4	9.12	7.65	11.1	11.8	10.4	12.9
Copper	88.1	24.7	28.3	20.1	37.3	31.2	13.2	30.4
Lead	8.91	9.07	6.08	4.58	8.48	7.93	6.63	7.95
Mercury	0.074	0.066	0.065	0.034	<0.039	<0.039	<0.034	<0.039
Molybdenum	<0.186	<0.207	<0.195	<0.186	<0.195	<0.190	<0.194	<0.178
Nickel	10.7	8.89	6.53	5.70	8.84	8.12	7.57	8.96
Selenium	<1.86	<2.07	<1.95	<1.86	<1.95	<1.90	<1.94	<1.78
Silver	<0.149	<0.165	0.172	<0.149	<0.156	<0.152	<0.155	<0.14.3
Thallium	63.6	61.4	43.4	34.6	61.6	53.3	53.2	62.7
Vanadium	73.0	71.2	47.2	36.4	58.6	60.6	51.2	67.0
Zinc	67.5	50.5	39.6	30.6	48.6	47.8	37.8	51.3
Toluene (µg/kg)	56.0	25.0	13.0	ND	ND	25.0	ND	ND
Pesticides (µg/kg)	ND	ND	ND	ND	ND	ND	ND	ND
Total PAHs (µg/kg)	ND	ND	ND	ND	ND	ND	ND	ND

Notes: 1. All metal values are in mg/kg
PAH-Polychlorinated aromatic hydrocarbons
See Figure 2.7 for sampling locations.
Source: MEC Analytical Systems 1992

layers from other adjacent areas, there is no indication of widespread contamination with pesticide residues. In total, the soils from areas considered for dredging/excavation appear to be free of significant chemical contamination and are expected to be suitable for upland or aquatic disposal.

South Channel Site

Sediments from the South Channel site sampled by Anderson et al. (1998) contained several metals at or near background concentrations (arsenic — 6.3 mg/kg; cadmium — 0.13 mg/kg; chromium — 46.7 mg/kg; copper — 20.8 mg/kg; lead — 15.4 mg/kg; mercury — non-detectable; nickel — 12.6 mg/kg; silver — 0.18 mg/kg; selenium — non-detectable; and zinc — 87.2 mg/kg). Polychlorinated biphenyl's (Aroclor 1254 – 3.6 µg/kg), several pesticides and pesticide derivatives, including dieldrin (12.7 µg/kg), p,p'-DDE (36.4 µg/kg), o,p'-DDE (3.41 µg/kg), and o,p'-DDD (1.52 µg/kg), and tributyltin (0.02 µg/kg), were also present in trace amounts. Similarly, trace quantities (less than 10 µg/kg) of three polycyclic aromatic hydrocarbons, fluoranthene, pyrene, and benzo(b)fluoranthene, were present in the sediment. These compounds are typical components of automobile exhaust that likely were added to the lagoon by aerial deposition or runoff. Despite the generally low contaminant concentrations, the report concluded that concentrations of dieldrin and DDE were sufficiently high to represent potential adverse effects to aquatic organisms. Additional testing further indicated that the sediment was acutely toxic to one marine test species (*Rheopoxynius abronius*) but not others (*Ampelisca abdita*). Based on these results, the study characterized sediments from this location as impacted. Similar results were observed for sediments from Los Peñasquitos Lagoon, which were toxic to test organisms but contained minimal chemical contamination. Nevertheless, the area of San Dieguito Lagoon sampled for this study is not being considered for dredging as part of the proposed action.

Other Areas

Several areas of potential contamination located adjacent to the Lagoon restoration area were also documented in the Phase I ESA report (Tetra Tech 1991), including a municipal burn dump and leaking underground storage tank (UST) sites at the Del Mar Fairgrounds. The burn dump, which is located north of the Airfield Property, immediately north of the San Dieguito River, has been issued a low priority rating by the State of California. A representative of the California Regional Water Quality Control Board (RWQCB) indicated that three active leaking UST sites are located at the Del Mar Fairgrounds (specifically the Del Mar Thoroughbred Club), which is also located immediately north of the San Dieguito River. The exact location of these UST sites within the Fairgrounds, with respect to the San Dieguito Lagoon, is detailed on the State Water Resources Control Board's Geotracker website for UST sites (http://geotracker.swrcb.ca.gov/). These sites are located to the north of the river outside the proposed boundaries of the proposed excavation area for the current project. The soil and groundwater had previously been adversely impacted by petroleum hydrocarbons (i.e., diesel, gasoline) at each of these sites. Groundwater is present at a depth of 5 to 6 feet at the UST sites (personal communication, Corey Walsh 1998). These sites were remediated by tank removal and soil excavation to the satisfaction of the San Diego County Department of Environmental Health Services and no longer pose a threat to groundwater or the environment (http://geotracker.swrcb.ca.gov/). Other contaminated sites were identified within a 1-mile radius of the airfield site; however, all of these properties are located a

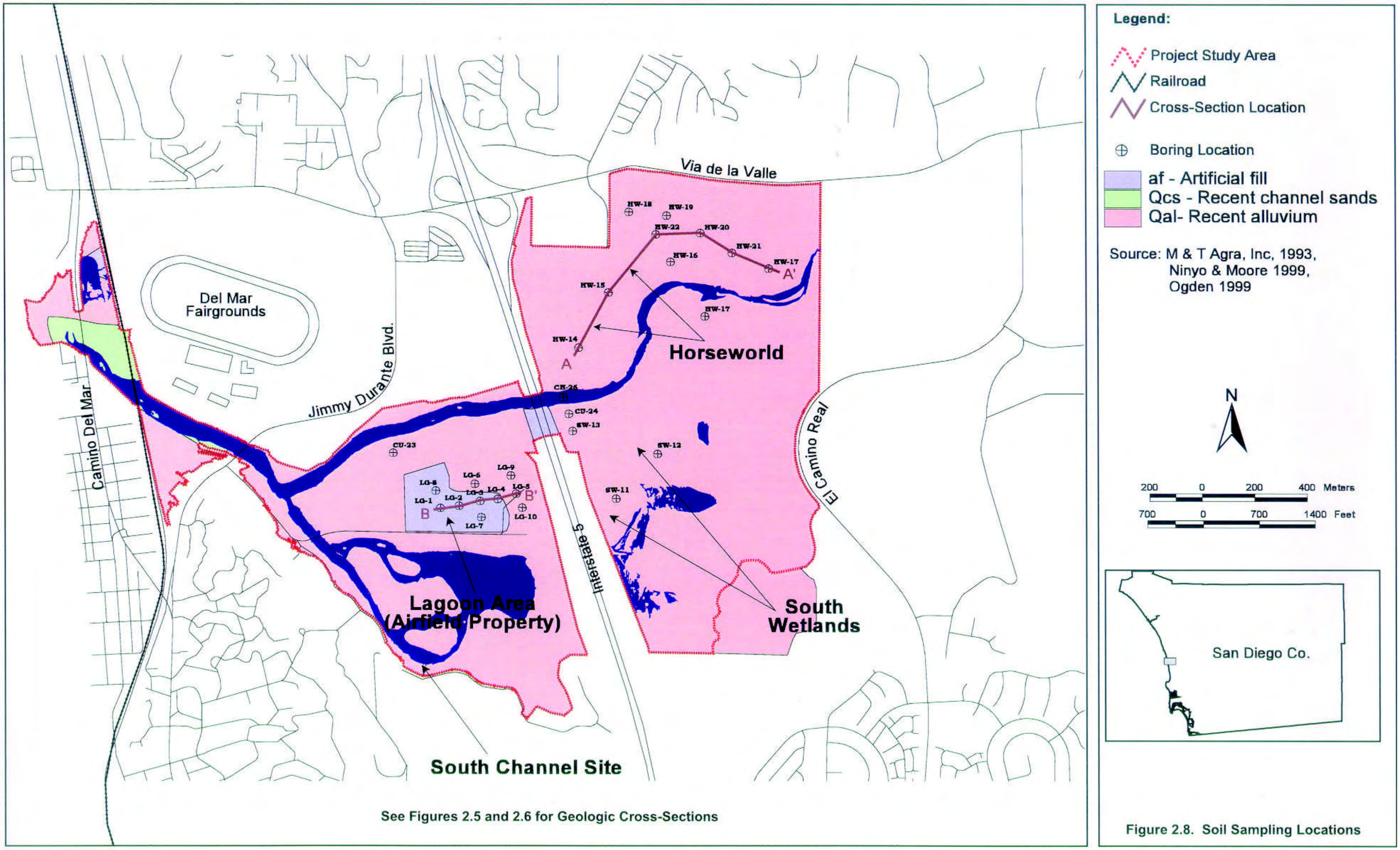


Figure 2.8. Soil Sampling Locations (Ogden 1999 Study)

Table 2.7. Summary of Chemical Characteristics of Sediments and Soils within the San Dieguito Lagoon Project Area

	HORSEWORLD*		SOUTH WETLANDS*		LAGOON*			
	Layer 1	***Layer 2***	***Layer 1***	***Layer 2***	***Layer 1***	***Layer 2***	***Layer 3***	***Layer 4***
Tot. Vol. Solids (%)	0.4-2.9	0.7-3.5	1.2-1.9	0.8-3.1	2.0-2.6	0.7-0.9	0.4-0.9	0.3-0.6
Tot. Org. Carbon (%)	0.03-0.2	0.04-0.32	0.04-0.17	0.02-0.36	0.2-0.3	0.04-0.1	0.03-0.11	0.02-0.08
Sulfides (mg/kg)	ND	ND	ND	ND	ND	ND	ND	ND
pH	7.96-8.69	7.98-8.47	7.28-8.68	7.75-8.39	7.94-8.18	7.86-8.00	7.76-8.18	7.73-8.17
Spec. Cond. (mmhos/cm)	567-6480	843-10,100	887-9890	622-17,300	3590-5400	5550-5970	7080-8930	8850-11,700
Chloride (mg/kg)	143-2292	200-6114	158-3910	139-8970	1380-2860	2460-2790	2990-3850	3790-5870
Nitrate (mg/kg)	1.0-10.3	0.9-4.4	3.6-18.0	1.8-12.9	1.8-3.5	1.2-1.7	0.9-1.7	1.2-1.6
Phosphorus (mg/kg)	132-441	214-596	70-228	98-249	187-243	146-197	118-150	61-182
Calcium (mg/kg)	917-6060	1090-4740	2120-7570	1330-3730	3660-4610	1830-2340	5380-15,000	7040-18,900
Magnesium (mg/kg)	1940-11,700	1530-15,400	2720-8380	2060-11,600	7610-10,300	4070-5380	2000-2170	1050-1430
Potassium (mg/kg)	1700-10,400	1370-14,200	3120-7840	1900-10,500	7170-10,100	4040-5490	1850-2000	656-1140
Sodium (mg/kg)	596-5790	678-8280	1170-4040	992-11,900	2180-3840	2030-2620	2160-3190	2750-3480
Boron (mg/kg)	ND-3.3	ND-18.8	ND	ND	ND-4.4	ND-1.8	ND	ND
Arsenic (mg/kg)	0.6-1.9	0.6-3.0	0.9-1.3	0.6-2.8	0.4-1.0	ND-0.4	0.6-2.1	0.6-0.9
Cadmium (mg/kg)	ND-0.27	ND-0.32	ND-0.21	ND	ND	ND	ND-0.18	ND-0.14
Chromium (mg/kg)	5.4-34	4.5-40	10-22	6.9-30	21-28	13-16	6.0-8.2	3.1-4.9
Copper (mg/kg)	3.3-26	2.8-31	8.7-14	3.4-19	13-19	9.8-160	4.7-6.1	5.2-7.3
Lead (mg/kg)	1.9-18	1.8-10	2.8-4.4	1.7-4.9	2.9-3.9	1.1-1.6	0.65-1.2	0.38-1.2
Mercury (mg/kg)	ND-0.028	ND	ND-0.04	ND-0.03	ND	ND	ND	ND
Nickel (mg/kg)	2.6-12	2.2-15	4.6-7.8	2.4-12	7.0-9.8	3.9-5.3	2.0-3.2	1.1-2.3
Selenium (mg/kg)	ND-1.8	ND-0.74	ND	ND	ND	ND	ND	ND
Silver (mg/kg)	ND-0.61	ND-0.26	ND	ND-0.14	ND	ND	ND	ND
Zinc (mg/kg)	12-62	9.9-71	20-43	9.7-53	38-51	27-33	12-13	8.3-9.5
TRPH (mg/kg)	ND-12.5	ND-13.3	ND-16.8	ND-9.7	ND	ND	ND-10.9	ND
PCBs (mg/kg)	ND	ND	ND	ND	ND	ND	ND	ND
PAHs (mg/kg)	ND	ND	ND	ND	ND	ND	ND	ND
Pesticides (mg/kg)	ND-0.27	ND	ND	ND	ND	ND	ND	ND
Tot. Phenols (mg/kg)	ND	ND	ND	ND	ND	ND	ND	ND
Tot. Phthalates (mg/kg)	0.02-0.15	ND-0.23	0.016-0.046	0.019-0.042	0.036-0.052	0.023-0.037	ND-0.041	0.029-0.079

Layer 1: ground surface to +3 NGVD;
Layer 2: +3 NGVD to -6 NGVD;
Layer 3: -6 NGVD to -30 NGVD;
Layer 4: -30 NGVD to -60 NGVD.

ND = not–detectable
* Location depicted on Figure 2.8
Source: Ogden 1999

sufficient distance from the lagoon restoration area to not be considered a threat to lagoon soils.

Marine Sediments

Concentrations of selected chemical constituents, listed in Table 2.8 are characteristic of clean, uncontaminated marine sediments. For comparison, the average concentrations of these constituents in sediments from other areas of the Southern California Bight that are considered not significantly altered by anthropogenic activities are also presented in Table 2.8 Concentrations of chemical contaminants in sediments offshore from Del Mar Beach are consistently lower than those contaminant concentrations in other areas of the Bight, although these differences likely are related, in part, to differences in the grain size characteristics.

2.4.1.4 Soil Corrosivity

The corrosivity of on-site sediments was analyzed by Ninyo & Moore (1999, 2004) to evaluate its effect on concrete structures. Test results indicated the pH of the soil samples tested ranged from 6.9 to 8.7, which is considered neutral to slightly alkaline. The minimum electrical resistivity measured in the laboratory ranged from 80 to 805 ohm-cm, which is considered severely corrosive to ferrous (iron) materials. The chloride content of the soil samples ranged from 1,275 to 10,450 ppm, which is considered to be extremely corrosive to ferrous materials. The soluble sulfate content of the soil samples ranged from 0.02 to 0.84 percent, which represents a moderate to severe sulfate exposure for concrete.

2.4.2 Natural Resources

This section addresses mineral resources and agricultural resources.

2.4.2.1 Mineral Resources

The following discussion focuses on the regional significance of aggregate resources that are actively mined in San Diego County. No other mineral resources of value are expected within the project site.

Aggregate consists of sand, gravel, and crushed rock. Aggregate is considered a mineral commodity and provides bulk and strength for a multitude of uses in metropolitan areas, especially in developing areas where new construction is common. Sand and crushed rock are used as aggregate in Portland cement concrete (PCC) and asphaltic concrete (AC). Blocks of granite rock are quarried for decorative rock, monuments, and surface plaster. Large irregular blocks of stone are quarried for use as riprap. Decomposed granite is taken from pits for use as a base under road pavements and cold-mixed asphaltic pavement.

Aggregate materials are classified as either reserves or resources. Reserves are defined by the California Division of Mines and Geology (CDMG) as the "aggregate material believed to be acceptable for commercial use that exists within property boundaries owned or leased by an aggregate producing company, and for which permission allowing extraction and processing has been granted by the proper authorities." Aggregate resources include

Table 2.8. Grain Size and Chemical Characteristics of Coastal Marine Sediments

	DEL MAR[1]		S. CALIFORNIA BIGHT[2]
	Intertidal	*Subtidal*	*Non-Anthropogenic Sites*
Sand/Gravel (%)	100	100	57.6
Silt (%)	0	0	42.4
Clay (%)	0	0	-
Tot. Org. Carbon (%)	0.05	0.14	0.67
Sulfides (mg/kg)	<0.2	<0.2	-
Arsenic (mg/kg)	0.7	1.0	5.2
Cadmium (mg/kg)	0.02	0.02	0.3
Chromium (mg/kg)	2.5	11.4	32
Copper (mg/kg)	0.5	3.3	12
Lead (mg/kg)	1.8	2.6	9
Mercury (mg/kg)	<0.01	<0.01	0.03
Nickel (mg/kg)	1.0	3.6	18
Selenium (mg/kg)	<0.1	<0.2	0.28
Silver (mg/kg)	<0.3	<0.3	0.14
Zinc (mg/kg)	4.8	16.0	55
TRPH (mg/kg)	<1.0	6.0	-
Total PAHs (mg/kg)	ND	ND	<0.3
Total PCBs (mg/kg)	ND	ND	0.005
Total Pesticides (mg/kg)	ND	ND	0.009
Organotin (mg/kg)	ND	ND	-
Halomethanes (mg/kg)	ND	ND	-
Volatile Organics (mg/kg)	ND	ND	-
Other Semivol. Org. (mg/kg)	ND	ND	-

Notes: 1. U.S. Navy 1995
2. Schiff and Gossett 1998

"reserves as well as all similar potentially usable aggregate materials that can be economically mined in the future, but for which no use permit allowing extraction has been granted."

The scarcest aggregate deposits in San Diego County are those, which are suitable for use as PCC aggregate. The materials specifications for PCC aggregate are more restrictive than for other aggregate types. As a result, fewer deposits satisfy these specifications.

The State Mining and Geology Board has designated areas within San Diego County as having aggregate resources of regional significance. This information has been generated for the benefit of local lead agencies, as specified by the Surface Mining and Reclamation Act of 1975. Section 1, Subsection 7 of the State Mining and Geology Board Guidelines for Classification and Designation of Mineral Lands, adopted in 1978, requires the State Geologist to review mineral land classification information after a period of no longer than 10 years to determine whether reclassification and/or revision of projected requirements of construction materials is necessary (CDMG 1996).

The project site lies within the western San Diego County Production Consumption Region (P-C Region), as identified in CDMG Open-File Report 96-04. The report identifies areas according to the presence and absence of significant sand and gravel deposits through the development of a mineral resource zone (MRZ) classification system. Under the four possible classifications within the western San Diego County P-C Region, the project site is classified as an MRZ-1 region. The MRZ-1 classification refers to areas where adequate information indicates that no significant mineral deposits are present or where it is judged that there is little likelihood for their presence. This zone is applied where well-developed lines of reasoning, based upon economic geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is nil or slight.

The Conservation Element of the County of San Diego General Plan identifies the region of the county with the largest quantity of aggregate deposits and the greatest market for construction quality aggregate as the metropolitan market area, which is the area located south of the San Dieguito River Valley and west of the Laguna Mountains (San Diego County 1990), outside the project boundaries.

2.4.2.2 Agricultural Resources

Overview of Agricultural Resources in the General Project Area

Agricultural resources in the vicinity of the proposed project site are shown on Figure 2.9. All mapped categories are a minimum of 10 acres, with the exception of Grazing and Water, which are a minimum of 40 acres. Most of the area immediately surrounding the project site is classified as Urban and Built-up land or Other. The definitions of important farmland categories are provided in Table 2.9 Most agricultural land in the immediate project vicinity lies east of the site in and near Gonzalez and McGonigle canyons. Other important farmland in the vicinity is generally found in canyons and valleys east of I-5.

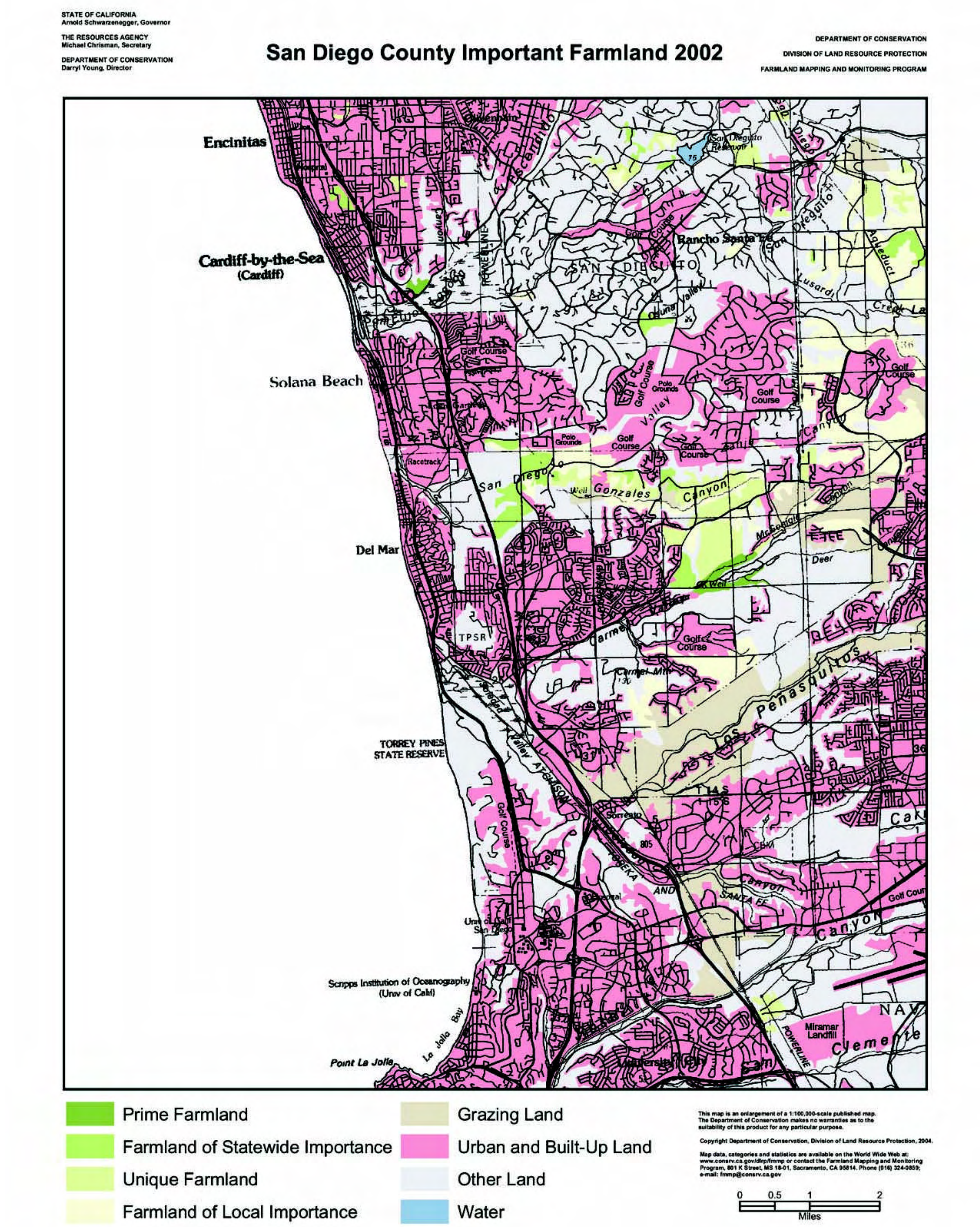


Figure 2.9. San Diego County Important Farmland

Table 2.9. Definitions for Important Farmland Categories

Farmland Category	***Definition***
Prime Farmland	Land that has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date.
Farmland of Statewide Importance	This land is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to hold and store moisture. Farmland of Statewide Importance must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date.
Unique Farmland	This is land of lesser quality soils used for the production of specific high economic value crops at some time during the two update cycles prior to the mapping date. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Unique farmland is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Examples of crops on Unique Farmland include oranges, olives, avocados, rice, grapes, and cut flowers. This category does not include publicly owned lands for which there is an adopted policy preventing agricultural use.
Farmland of Local Importance	This is land of importance to the local agricultural economy and is determined by each county's Board of Supervisors and local advisory committees. Examples of this type of land could include dairies, dryland farming, aquaculture, and uncultivated areas with soils qualifying for Prime Farmland and Farmland of Statewide Importance.
Grazing Land	Grazing land is land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock.
Urban and Built-up Land	This is used for residential, industrial, commercial, construction, institutional, and public administrative purposes; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures; and other development purposes.
Other Land	Other land is that which is not included in any of the other mapping categories. The following types of land are generally included low-density rural development; brush, timber, and other lands not suitable for livestock grazing; government lands not available for agricultural use; roads systems for freeway interchanges; vacant and nonagricultural land larger than 40 acres in size and surrounded on all sides by urban development; confined livestock facilities of 10 or more acres; strip mines and borrow and gravel pits; a variety of other rural land uses.
Water	Water areas with an extent of at least 40 acres.

Note: None of these categories includes publicly owned lands for which there is an adopted policy preventing agricultural use.

Source: Department of Conservation, no date.

San Diego County has experienced a steady loss of agricultural land due to an increase in the amount of Urban and Built-up Land over the past decade, as shown on Table 2.10 The amount of land actually under production has increased from 77,609 acres in 1987 to 162,723 acres in 2002, however (San Diego County Department of Agriculture, Weights & Measures 2002).

Agricultural Resources on the Project Site

Farmland classifications within the project site boundaries and the immediate vicinity are shown on Figure 2.10. A roughly 34-acre parcel of land classified as Farmland of Statewide Importance overlaps a portion of the eastern part of the site and extends east and south of the site. About 27 acres of disposal site DS36 also shares this classification. Additionally, a 43-acre parcel of Prime Farmland is located in the northeastern portion of the site just south of Via de la Valle; it adjoins 152 acres of land classified as Farmland of Local Importance.

Tomatoes currently are grown on several parcels of irrigated land located in the northeastern and southeastern portions of the project area. The largest parcels included within the restoration area boundaries together comprise about 83 acres. These parcels correspond to the area classified as Prime Farmland and portions of the land classified as Farmland of Statewide Importance. DS36 also contains about 24 acres of land under cultivation. A portion of the approximately 600 acres of the project site that are vacant includes land formerly used for agriculture.

2.4.3 Landforms and Visual Quality

2.4.3.1 Landforms

The project study area, which extends from west of El Camino Real to the Pacific Ocean, consists of a broad, relatively flat floodplain surrounded by gentle to relatively steep hillsides and coastal bluffs. The most prominent landforms within and adjoining the project site include the following:

- Beach area located to the north and south of the river mouth
- Steep, east-facing slopes of Scripps Bluff, located at the coast just to the north of the river mouth
- Existing tidal basin located in the Fish and Game Ecological Reserve
- Remnant seasonal wetlands located just to the east of I-5 and south of the river
- Eroded, west-facing bluff face also located east of I-5 and south of the river
- Naturally vegetated hillsides near the southeast edge of the study area that separate the lower lying properties within the river valley from the Carmel Valley community

The San Dieguito River Park Concept Plan (JPA 1994a) identifies the San Dieguito Lagoon as the most prominent landform feature in this area.

Table 2.10. San Diego County Land Use Conversions (1986 to 2002)

Land Use Category	NET ACREAGE CHANGED								
	1984-86	***1986-88***	***1988-90***	***1990-92***	***1992-94***	***1994-96***	***1996-1998***	***1998-2000***	***2000-2002***
Prime Farmland	-3,178	-563	371	-115	-217	-700	-440	-551	-238
Farmland of Statewide Importance	-11,599	-482	228	-1,078	-504	-58	-285	-331	-142
Unique Farmland	-1,255	1,540	1,591	-359	-1,310	-1,414	-199	-10,210	-276
Farmland of Local Importance	15,701	-3,817	-4,228	-4,735	2,016	679	-189	7,330	-3,818
Important Farmland Subtotal	**-331**	**-3,322**	**2,038**	**-6,287**	**-15**	**-1,493**	**-1,113**	**-3,762**	**-4,474**
Grazing Land	-3,918	-3,874	-3,992	-5,939	-1,546	-1,897	-522	-4,717	-2,617
Agricultural Land Subtotal	**-4,249**	**-7,196**	**-6,030**	**-12,226**	**-1,561**	**-3,390**	**-1,635**	**-8,479**	**-7,091**
Urban and Built-up Land	11,277	9,981	13,214	9,273	4,425	5,584	4,322	12,437	8,807
Other Land	-7,028	-2,813	-7,284	2,953	-2,918	-2,194	-2,731	-3,962	-1,716
Water Area	0	28	100	0	54	0	44	4	0
Total Area Inventoried	2,165,074	2,167,896	2,167,896	2,167,895	2,167,895	2,166,692	2,166,693	2,166,691	2,166,692

Source: Department of Conservation 1998b

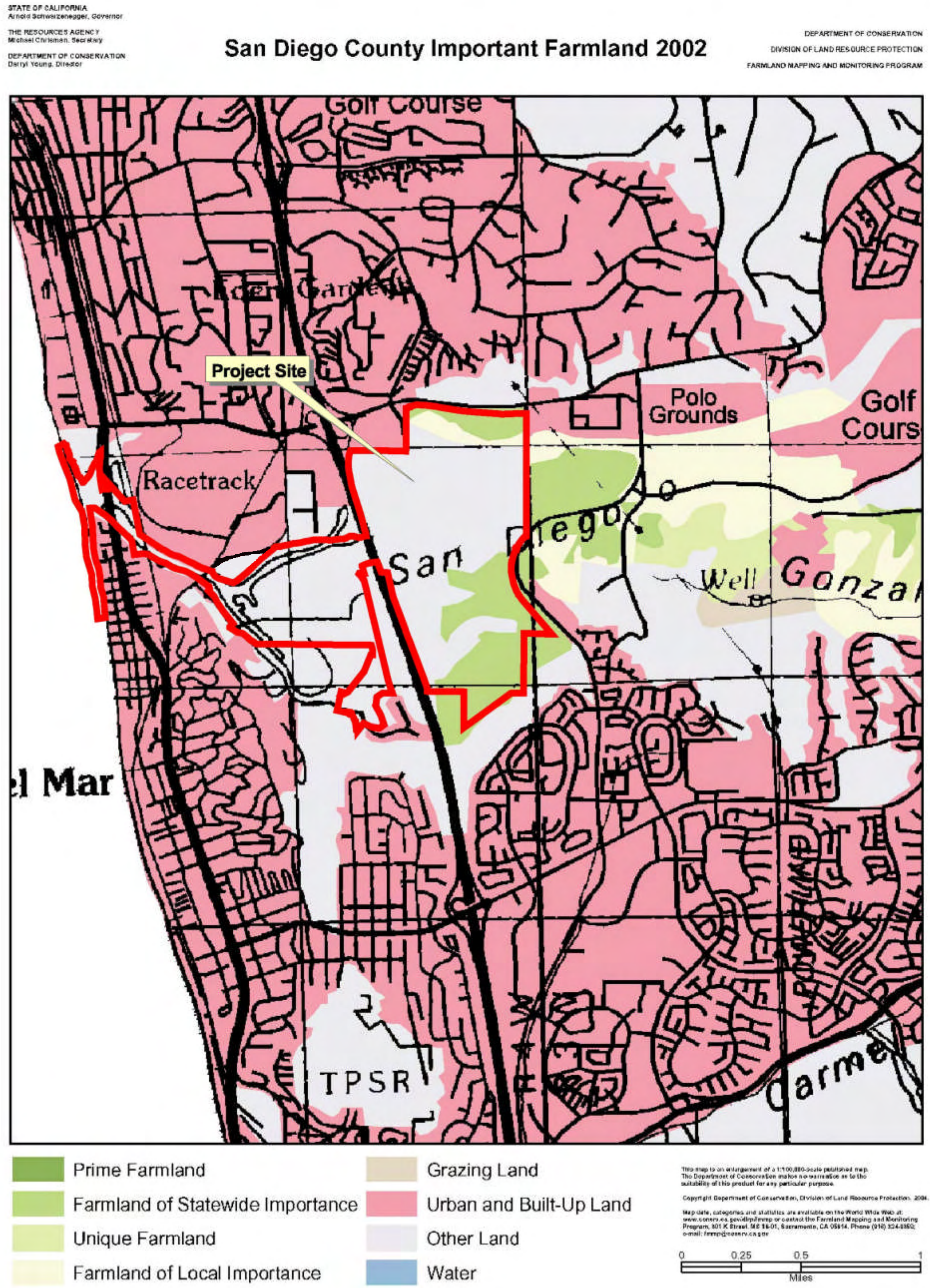


Figure 2.10. Important Farmland within and near Project Site

Ground surface elevations within the study area range from below sea level at the beach to approximately 170.0 feet, MSL at the south easternmost corner of disposal site DS36 (Figure 2.11). Elevations on the airfield property (location W1 on the plan views of the various alternatives) range from 8.3 feet, MSL to 9.5 feet, MSL. The Horseworld property, owned by SCE, is located to the east of I-5 and entirely within the floodplain, with current elevations ranging from 7.5 feet, MSL to 12.0 feet, MSL. The property to the northeast, the Via de la Valle property, includes portions of the river floodplain, as well as a relatively gentle slope the rises out of the floodplain to Via de la Valle. The top of this slope ranges from approximately 35 feet, MSL at the northwest property boundary to a high point of about 52.0 feet, MSL.

To the east of I-5 and south of the river, the characteristic landforms include the floodplain and a slightly higher land mass that extends out as finger ridges from El Camino Real west toward I-5. Elevations in the floodplain average about 10.5 feet, MSL, while the adjoining ridges range from 20.0 feet, MSL near the western edge to about 60.0 feet, MSL near El Camino Real. This higher landmass gradually rises in elevation with the lower elevations occurring in the northwest and steadily increasing to southeast where elevations exceed 130.0 feet, MSL.

2.4.3.2 Visual Quality

Unobstructed views of the project site are available from numerous public roads and open space areas throughout the western river valley. The views from these public areas are described from west to east in the following paragraphs. Several photographs are also provided to illustrate the visibility of the restoration area. These photographs, along with a figure showing the location from which these photographs were taken, are shown in Figures 2.12 through 2.18.Views from the Beach.

From the beach, views of the project site are limited to those of the river mouth. Long-distance views to the east are blocked by the Highway 101 Bridge. Views of the river mouth vary depending upon hydrologic conditions. For example, in December 1998, the river formed a channel that allowed water from upstream to flow into the ocean and tides to flow east into the lagoon. However, by May 1999, the river mouth had closed and the view from the beach was of a wide sandy beach stretching the entire length between Scripps Bluff Preserve and the homes located along Sandy Lane to the south.

Views from Scripps Bluff Preserve Overlook

Much of the project site is visible from the Scripps Bluff Preserve Overlook. The closest views are of the river mouth and Highway 101. Also in immediate view is the river channel between Highway 101 and Jimmy Durante Boulevard. A portion of the south channel that connects the river to the Fish and Game property, located beyond the Jimmy Durante Bridge, is also visible. Due to landform characteristics, I-5, and existing development on the Fairgrounds, it is difficult to see much of the area proposed for tidal restoration. Only glimpses of Areas W1 and W4 are provided. Portions of the far eastern end of the project, including the City of San Diego's 105-acre parcel and the adjoining southern slopes of the river valley that are currently under cultivation, are visible from this vantage point.

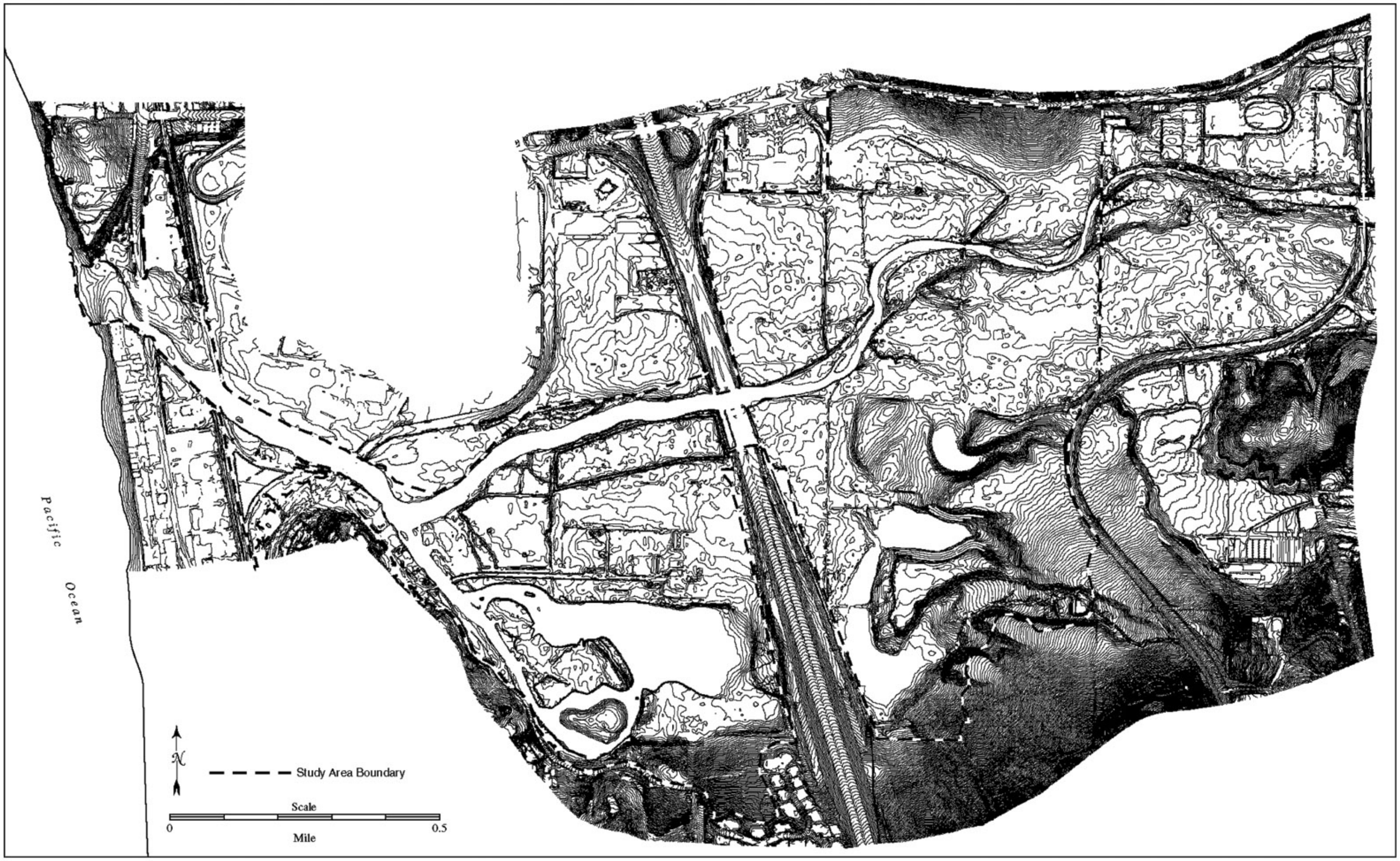


Figure 2.11. Western San Dieguito River Valley Topography

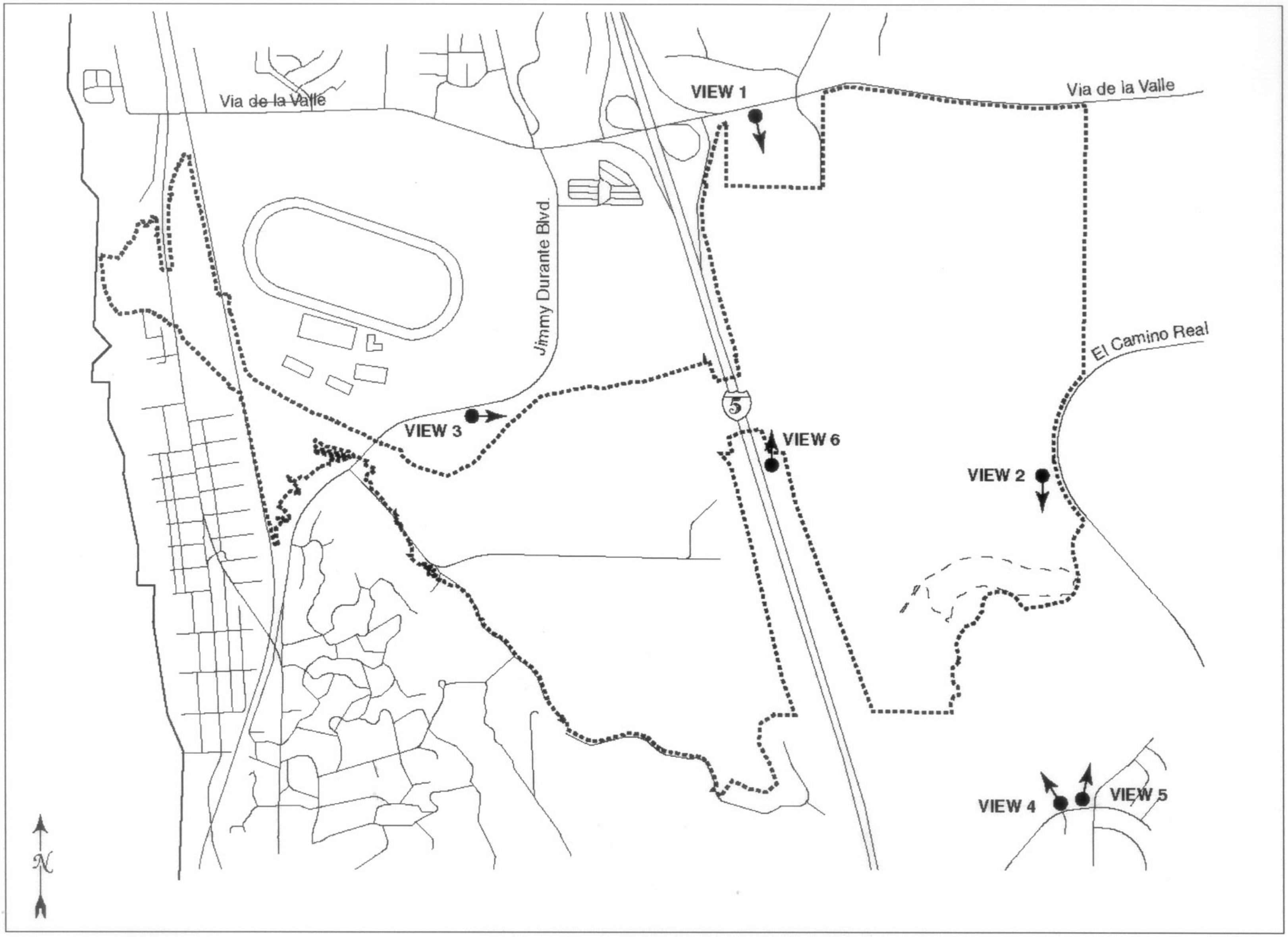


Figure 2.12. Viewpoints for Site Photographs and Simulations

Source: Estrada Land Planning 1999

Figure 2.13. View 1: Existing View from Via de la Valle Looking South

Source Estrada Land Planning 1999

Figure 2.14. View 2: Existing View from El Camino Real Looking South

Source: Estrada Land Planning 1999

Figure 2.15. View 3: Existing View from Jimmy Durante Boulevard Looking Southeast

Source: Estrada Land Planning 1999

Figure 2.16. View 4: Existing View from Overlook Park Looking Northwest

Source: Estrada Land Planning 1999

Figure 2.17. View 5: Existing View from Overlook Park Looking Northeast

Source: Estrada Land Planning 1999

Figure 2.18. View 6: Existing View from I-5 Northbound Looking Northeast

Views from Highway 101

From the footpath, bike lane, or roadway where Highway 101 crosses the river mouth, views of the beach and ocean are available to the west. To the east, various levels of visibility are provided depending upon whether the view is from the north or southbound lanes. The river channel between the Highway 101 Bridge and the Jimmy Durante Bridge is visible; however, for much of the distance across the bridge, the distant views of the valley are blocked by the racetrack grandstand. Near the southern end of the bridge, the southern slopes of the river valley, including the location of proposed disposal site DS36, are visible.

Views from the Paved Walkway between Highway 101 and the Railroad Bridge

Looking west from this public walkway, views of the beach and river mouth are blocked by the Highway 101 Bridge, but much of the eastern end of the project is visible from this location. Along the pathway, views of the river channel dominate the foreground. The railroad and Jimmy Durante bridges are very visible. Also included in the viewshed are the I-5 embankment and the southern slopes of the San Dieguito River Valley.

Views from Jimmy Durante Boulevard

There is limited visibility of the western project area from Jimmy Durante Boulevard due to the roadway's super-elevated curve design. Glimpses of the airfield property can be seen from the Jimmy Durante bridge, as can the riverbanks to the east and west of the bridge. To the west, the main view is of that portion of the river channel that occurs between Jimmy Durante Boulevard and the railroad bridge.

Views from the Grand Avenue Bridge

The main views from the Grand Avenue Bridge are of the restored Fish and Game property and the abandoned airfield property. The riverbanks near the Jimmy Durante Bridge are also visible from this vantage point. Views of the project area east of I-5 are essentially blocked by the freeway embankment.

Views from I-5

Looking west from both the north and southbound lanes, the entire western end of the project site is visible from the freeway to the ocean. Views to the east include all of the area from the freeway east to beyond El Camino Real. Near the southern end of the river valley, the views from the freeway include side views of the north-facing slopes that extend from the freeway east to El Camino Real.

Views from Via de la Valle

Traveling east from Highway 101 along Via de la Valle, glimpses of the southern slopes of the San Dieguito River Valley are provided through the bottlebrush trees that line the Fairgrounds' northern border. Views are then blocked by buildings and elevational changes from the eastern end of the fairgrounds until just past San Andres Drive, well east of I-5. From about San Andres Drive to the western boundary of Horsepark, travelers along Via de la Valle have an unobstructed view of the valley and the southern slopes beyond. The slopes adjacent to Via de la Valle drop off quickly into the floodplain, allowing for sweeping views of the river valley. This portion of the valley is generally under various stages of cultivation, with views ranging from large open areas of weedy vegetation or freshly plowed fields with clear plastic protection to fully developed tomato fields. Several power lines cross the view corridor, including one that runs along the southern edge of Via de la Valle and several others that extend across the river valley to the edge of the floodplain and beyond. Open water is generally visible within the seasonal wetlands located just to the east of the I-5 embankment. The lower slopes of the valley's southern hillsides have been under cultivation for many years. The upper slopes support native coastal chaparral vegetation, which is preserved as dedicated open space. Views of the project area west of I-5 are blocked by the I-5 embankment.

Views from El Camino Real

From the San Dieguito River southward to just before the major curve on El Camino Real, travelers along El Camino Real can see the main portion of the floodplain between El Camino Real and I-5. The slopes along the northern edge of the river valley are visible; however, the views of the southern slopes are obscured by higher intervening landforms. Once through the curve, the southern slopes of the river valley come into view, as does the City of San Diego's 105-acre parcel. Distant views of areas south of the river are also available to northbound travelers through this stretch of the roadway. Near the southern extent of the agricultural fields, travelers on El Camino Real looking west have unobstructed views of the western river channel and ocean beyond.

Views from High Bluff Overlook Park

The most dramatic views of the project site are provided from High Bluff Overlook Park located along High Bluff Drive at the top of the southern river valley slopes. Views from this vantage point are from east of El Camino Real to the ocean, and well to the north of Via de la Valle. In the foreground, the naturally vegetated slopes at the top of the river valley's southern slopes are visible. Below the boundaries of the preserved open space, the view changes to that of cultivated fields that continue to slope down to an intermediate bluff top that overlooks the seasonal wetlands situated just to the east of the I-5 embankment. These seasonal wetlands are also visible from the overlook, as is a small teardrop-shaped wetland that generally only contains water during the rainy season. Also visible is a ribbon of riparian habitat that extends from El Camino Real west into the southern end of the seasonal wetlands. This riparian area supports native willows, as well as about 18 non-native eucalyptus trees at various levels of maturity. Five to eight larger eucalyptus trees also occur to the north of the riparian area near El Camino Real.

The broad floodplain extends north toward Via de la Valle with no noticeable elevational changes until the valley floor gently rises up to the existing roadway. The San Dieguito River bisects the floodplain, and glimpses of the water within the river are available from this vantage point. To the north of the river, the commercial shopping center located at the southeast corner of the I-5/ Via de la Valle intersection is visible. Behind the center on the

Horseworld property are views of seasonal salt marsh and disturbed vegetation areas. Within the seasonal salt marsh, one can see open patches of white saltpan.

East of San Andres Drive, the views are of a gentle slope that is currently under cultivation. To the east is the 22nd District Agricultural Association's Horsepark property. Numerous equestrian facilities are visible, although somewhat screened by the non-native trees that line the northern edge of the river.

I-5 bisects the viewshed at an elevation significantly higher than the surrounding floodplain. The freeway slopes have been revegetated with coastal sage scrub species that give the slopes a brown tone during most of the year. Views from I-5 westward include the open water and restored salt marsh areas of the Fish and Game Ecological Reserve, located to the southwest of I-5. To the north of this resource area is the vacant land referred to as the airfield property. The airfield property appears as a flat weedy area that supports greenish brown vegetation in the winter. The site's appearance is brightened by the yellow hues provided by weedy mustard plants in the late spring, but it soon returns to its typical greenish brown tones by early summer. Beyond the airfield property are views of the San Dieguito River.

Farther to the north are the dirt overflow parking lots and driving range that are owned and operated by the 22nd District Agricultural Association. Some of the views of the parking lots are obscured by large truck trailers parked along the northern edge of the river. The typical height of these trailers is 13.5 feet. To the northwest is the Fairground's main paved parking lot, with the racetrack grandstand just beyond that to the northwest. Farther to the west are views of the river channel and the ocean.

Visual Significance of the Project Area

The San Dieguito River Park Concept Plan (JPA 1994a) identifies this area as the "western gateway to the river valley" and recommends that the "sweeping open space views" be preserved. This plan goes on to recommend that "view opportunities of the lagoon and ocean from trails and existing circulation routes" be preserved and where appropriate, enhanced. Although no state scenic highways or locally designated scenic routes have been established in the project area, the City of San Diego's Progress Guide and General Plan (1989b) not only indicates that I-5 through the project area is eligible for state designation, but it also recommends I-5 for designation as a State Scenic Highway.

2.5 BIOLOGY

2.5.1 Background

The San Dieguito Lagoon has the largest watershed area (about 350 square miles) of the six San Diego County coastal lagoons, and, prior to the late 1800s, provided the greatest expanse (about 600 acres) of estuarine open water and wetland habitats in San Diego County between the Santa Margarita River and Mission Bay (Mudie et al. 1976; Sea Science Services and Pacific Southwest Biological Services 1980; MEC 1993). This wetland system had developed gradually over several thousand years as slowly rising sea levels flooded the lower San Dieguito River valley, and marsh vegetation established on sedimentary deposits resulting from tidal and fluvial processes.

Between the 1880s and 1970s, landfilling for development, the construction of rail and road corridors, and agricultural operations reduced the extent of estuarine open waters and wetlands to about 200 acres, while constraining or eliminating tidal and riverine influences in remaining wetlands. The amount of water exchanged during a tidal cycle was reduced from 850 acre-feet in 1889 to only 120 acre-feet. As a consequence of the reduced tidal prism and less frequent flood scouring following the construction of the Lake Hodges dam, lagoon closures due to natural berming of the river mouth became common from the 1940s onward. Lagoon closure undoubtedly exacerbated the effects of sewage effluent, which was discharged into the lagoon from 1940 to 1974, as well as the effects of urban and agricultural runoff. Episodes of flooding have also resulted in large volumes of sediment and debris being deposited in existing wetlands (MEC 1993).

In its present condition, the San Dieguito Lagoon represents a valuable but greatly diminished wetland ecosystem relative to historic conditions. Although the lagoon, including non-tidal wetlands and flats southeast of the I-5 crossing, continues to provide regionally important feeding and resting areas for migratory birds along the Pacific Flyway; as well as tidal open water, mudflat, and salt marsh habitats for a variety of birds, fishes, and invertebrates (MEC 1993), it has suffered significant damage as a result of human alteration. Restoration of this lagoon would substantially improve the biological value of this resource by not only increasing the size and diversity of the wetland habitats but also through establishing a continuous tidal influence that will support marine fish and invertebrates. The excavation and restoration of a tidal basin with bordering salt marsh on California Department of Fish and Game (CDFG) property in 1982 halted the trend of declining acreage and quality of estuarine habitats, but the lagoon remains vulnerable to periods of closure and resulting extremes of temperature, salinity, and dissolved oxygen. Reduced habitat areas and the history of lagoon closures and consequent poor water quality probably account for the absence of many species of plants and animals that occur in other Southern California salt marshes (Sea Science Services and Pacific Southwest Biological Services 1980; Zedler 1982; MEC 1993).

This section provides a habitat-by-habitat description of vegetation, wildlife, and aquatic biota, followed by a species-by-species discussion of rare, threatened, or endangered species, within the project area boundaries. In the habitat descriptions, additional subheadings are identified where necessary to fully describe the resource.

The primary sources of historic information are the San Dieguito Baseline Biological Survey, which incorporated results of field studies conducted during 1992-1993 (MEC 1993), and the updated information contained in the EIR/EIS. The EIR/EIS team conducted independent field investigations, literature review, and review of more recent (1997-99) aerial photography as necessary to confirm or correct previously assembled information. Field surveys were conducted by systematically visiting all accessible parts of the restoration area, focusing on the characterization of native habitats and comparing these observations with the existing information. These reports combined field observations and sampling with aerial photography were used to define and map habitats on the site. Biological resource information was also assembled for the *San Dieguito River Park Concept Plan* (Jones et al. 1993; JPA 1994 a, 1994b).

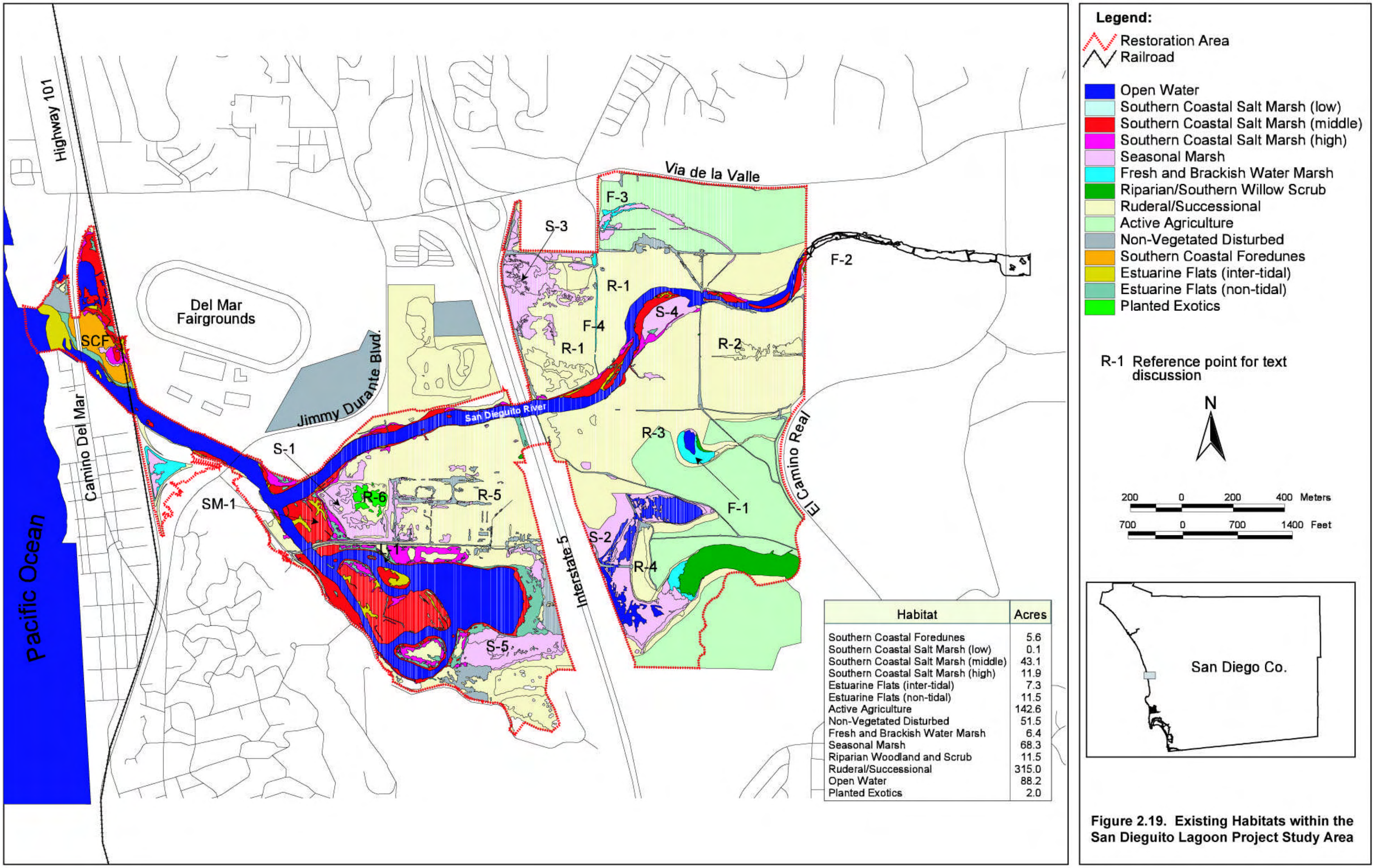
Habitat types are generally defined by the dominant vegetation community, except in cases where vegetation is lacking (e.g., open water). The original habitat map of the project site (MEC 1993) was based on a modified version of the Holland (1986) system, resulting in the classification and mapping of 26 habitat types that include 13 different vegetation types. Some of the mapped habitat types grade into each other, making their differentiation difficult, particularly when the "boundaries" between such habitats (based, for example, on the extent of ponding or the composition of the vegetation) may shift in response to changes in land use, precipitation, river flooding, El Niño-related changes in sea level, and episodes of lagoon closure over a 5- to 10-year period. In a few cases as noted below, certain transitional habitats are included within broader categories for the sake of simplicity and to provide a more cohesive description of ecological functions.

Figure 2.19 shows the distribution and acreage of habitats within the project area.

The distribution and quality of wetland habitats in the San Dieguito Lagoon ecosystem reflects the interaction of tidal-marine and freshwater influences operating within a strongly modified topographic basin. Human modification of the landscape has tended to segregate marine and freshwater influences and has eliminated marine-freshwater transitional habitats that were undoubtedly common at the interface between the river floodplain and the historic lagoon. Tidal exchange is now confined within a tidal basin that is limited to the river channel and a relatively small area of historic and restored salt marsh and lagoon southwest of the I-5 crossing. Non-tidal freshwater and seasonal wetlands (see below) are confined to a series of basins in the surrounding floodplain above the zone of tidal influence.

Within the existing tidal basin, tidal exchange maintains the physical and chemical conditions (see section 4.2) that allow marine and tidal salt marsh species to disperse and persist, and it determines the vertical and horizontal distribution of habitats where various species can survive. As long as the mouth of the lagoon remains open and where tidal circulation is unrestricted, the daily, biweekly, and seasonal periodicities of tidal flooding and drainage as a function of elevation are predictable, as is the zonation of subtidal and intertidal habitats with respect to elevation. Normal patterns of inundation and emersion are disrupted during periods of inlet closure when tidal exchange ceases. At these times, which coincide with low flows in the river due to seasonal or long-term drought, continuously submerged areas stagnate and experience rising temperatures and depleted levels of oxygen; salinity may rise or fall, depending on the influx of freshwater; and pollutants from watershed sources such as agricultural and urban runoff may become concentrated in the lagoon.

Within the tidal basin, freshwater influences are comparatively weak much of the time, as the Mediterranean climate of the region produces relatively long periods of low flow in the lower San Dieguito River. These dry periods are punctuated, however, by brief, seasonal episodes of rainfall and heavy runoff that bring reduced salinity, inputs of sediment and woody debris, and erosion that can reshape the river channel. Wetland habitats in non-tidal basins are subject to extreme variability in the duration and depth of flooding as a function of seasonal and long-term variations in rainfall.



Habitat	Acres
Southern Coastal Foredunes	5.6
Southern Coastal Salt Marsh (low)	0.1
Southern Coastal Salt Marsh (middle)	43.1
Southern Coastal Salt Marsh (high)	11.9
Estuarine Flats (inter-tidal)	7.3
Estuarine Flats (non-tidal)	11.5
Active Agriculture	142.6
Non-Vegetated Disturbed	51.5
Fresh and Brackish Water Marsh	6.4
Seasonal Marsh	68.3
Riparian Woodland and Scrub	11.5
Ruderal/Successional	315.0
Open Water	88.2
Planted Exotics	2.0

Figure 2.19. Existing Habitats within the San Dieguito Lagoon Project Study Area

The following descriptions provide scientific names for all plants and non-avian wildlife species discussed in text. Bird names follow standardized English nomenclature used in the American Ornithologist's Union (AOU) Checklist of North American Birds. In the habitat by habitat wildlife discussions included in this section, a species identified with a primary habitat type may be found in other habitat types as well. For example, many waterfowl use open water for feeding, shorelines and shallow areas for wading, and marsh vegetation for cover and nesting. Some waterfowl species, such as Canada geese, will also use upland areas for feeding.

2.5.2 Subtidal and Intertidal Mudflats

This category includes both permanently inundated subtidal areas and contiguous unvegetated intertidal (estuarine) mudflats, the latter ranging from frequently flooded (extreme low water to mean sea level) to frequently exposed (above mean sea level). Along the open coast of San Diego County, the boundary between subtidal and intertidal habitats is at –0.9 feet NGVD. Within the lagoon, the boundary is a function of the *sill* elevation at the river mouth, which determines the depth to which water can drain out of the lagoon at low tide. Hence many areas of potential intertidal mudflat become subtidal open water when tidal flushing is reduced due to higher sill heights or when the mouth of the lagoon is closed. At present the mouth of the lagoon, when open, has a sill elevation of about 0 NGVD (Jenkins and Wasyl 1998); lower elevations are subtidal. The upper elevational limit of mudflats is a function of the lower limit of salt marsh vegetation which, in the case of low salt marsh, may extend downward to approximately +1.3 feet NGVD (Josselyn and Welchel 1999). Obviously, mudflats can extend higher in the absence of low salt marsh vegetation.

Most of the elevational range typically associated with intertidal mudflats is subsumed within the open water habitat as shown in Figure 2.19. This is appropriate because broad, low-intertidal flats are mostly lacking. Instead, there are relatively narrow unvegetated transition zones along banks and slopes separating subtidal open water from bordering salt marsh habitats. River and channel banks throughout the lagoon have been steepened by scour, and the areas of intertidal mudflat shown in Figure 2.19 represent frequently exposed mudflats that are protected from scour by surrounding salt marsh vegetation.

Lagoon hydrology has, historically, been unstable due to closure of the inlet for extended periods of time (Elwany et al. 1995, 1998). During these periods, potential areas of intertidal mudflat that would otherwise have experienced regular cycles of flooding and exposure became continuously ponded or exposed depending on water elevations, and subject to severe disruption of the normal physical and chemical conditions associated with tidal flushing (Sea Science Services and PSBS 1980; MEC 1993). As a result, in addition to being of limited extent, true intertidal mudflats have only existed on an intermittent basis within the lagoon, and the associated biota have periodically been decimated by episodes of lagoon closure (MEC 1993).

The following subsections describe the occurrence of various types of organisms in open water and adjacent tidal mudflat habitats.

2.5.2.1 Plankton

Plankton are free-floating or weakly swimming plants and animals that form the base of the aquatic food chain. Plankton communities vary considerably from season to season due to changing conditions of temperature and salinity and prevailing currents. Phytoplankton studies conducted in nearshore waters off Southern California (Tetra Tech 1985, USEPA 1988) indicated that diatoms are the largest component of the phytoplankton community, followed by dinoflagellates. For example, diatoms and dinoflagellates were numerically dominant in phytoplankton samples collected from well-flushed embayments such as Mugu Lagoon (Macdonald 1976) and Mission Bay (Fairbanks 1969 as cited by Rieger and Beauchamp 1975). The makeup of plankton communities in most Southern California lagoons tends to be similar within a region because of transport by currents, tides, and river flows.

Phytoplankton communities in San Diego County lagoon typically consist of pennate (oval-shaped) and chain-forming diatoms such as *Pleurosigma* and *Gyrosigma* (Zedler and Nordby 1986) and dinoflagellates such as *Gymnodinium* spp. *Pleurosigma* and *Gyrosigma* are a primary food source for various species of mollusks and fishes.

Similar to phytoplankton communities, species composition and abundance of zooplankton in tidal lagoons in the Southern California region are assumed to be similar to those of coastal waters. Based on several studies, including Tetra Tech (1985) and USEPA (1988), the major holoplankton groups include copepods, euphausids, and chaetognaths. Calanoid and harpacticoid copepods (microcrustaceans) are likely the most common zooplankton species based on their predominance in many other Southern California embayments (SDG&E 1980, SDUPD 1993). Also, larvae of benthic polychaetes (segmented worms) and molluscs carried by currents into the area may represent an additional food source for many local fishes and invertebrates.

Other plankton assemblages within San Dieguito Lagoon probably include fish eggs and larvae (ichthyoplankton). Based on collections of adult fishes by Greenwald (1985) in the lagoon, the most common ichthyoplankton likely occurring in open water habitats include topsmelt (*Atherinops affinis*), California killifish (*Fundulus parvipinnis*), and diamond turbot (*Hypsopsetta guttulata*). The distribution of several ichthyoplankton species in South San Diego Bay were described by McGowan (1981), who found that eggs of the deepbody anchovy (*Anchoa compressa*) and diamond turbot were the most commonly collected species.

2.5.2.2 Benthic Invertebrates and Algae

Invertebrates are important components of aquatic ecosystems and represent a food source for many fish and birds. Benthic invertebrates consist of infauna (organisms living in the sediments) and epifauna (organisms living on the sediments). Information on benthic invertebrates was previously collected by Pacific Southwest Biological Services, Inc. (PSBS) (1979), Greenwald (1984), and MEC (1993). MEC (1993) collected 42 intertidal and 60 subtidal invertebrate species using both cores and benthic trawls. When the lagoon inlet was closed and there was no tidal exchange, intertidal habitats were defined as being about 1 foot above the water line in an area that would have been intertidal had the lagoon been open (MEC 1993).

The most common intertidal infaunal invertebrates collected were polychaete worms from several families including capetellids (*Capitella "capitata"*) and spionids (*Polydoras* and *Streblospiol*), oligochaetes, small bubble snails (*Cylichnella inculta*), clams (*Tagelus subteres*), and phoronids, and a variety of insects (MEC 1993). Commonly observed intertidal epifauna (not sampled systematically) include California horn snail (*Cerithidea californica*) shore crabs (*Pachygrapsus crassipes* and *Hemigrapsus oregonensis*) (MEC 1993). Community composition and species abundances were extremely variable between fall 1992 and spring 1993 sampling periods, reflecting physical and chemical conditions brought about by heavy river flows which breached the lagoon inlet in the aftermath of a prolonged period of lagoon closure (MEC 1993).

A list of the five most common subtidal infaunal invertebrate species collected by MEC (1993) at various habitats throughout San Dieguito Lagoon is presented below in Table 2.11 Some of these species included polychaete worms such as spionids (*Boccardia*, *Boccardiella*, *Polydora*, *Prionospio*, *Pseudopolydora*, and *Streblospio*) and amphipods (*Corophium*, *Grandidierella*, *Hyallela*, and *Tethygenia*). Other common species in subtidal habitats include snails (*Cylichnella*, Hydrobiidae, and Rissoidae) and clams (*Cryptomya* and *Tagelus*).

Areas along the San Dieguito River channel west of I-5 had greater numbers of individuals and more species than areas east of I-5 where brackish water predominated (MEC 1993). Densities of subtidal invertebrates west of I-5 were 2 to 8 times higher (350-900 individuals/m^2) than areas east of I-5 (150 individuals/m^2). The most abundant species in the marine areas west of I-5 included molluscs and crustaceans such as shrimp, phoronids, and clams (e.g., *Tagelus*) (MEC 1993).

Seasonal patterns in invertebrate abundance are commonly observed, with generally higher numbers of individuals in the spring and summer for most species and lower abundances during the rainy season (October to February). Invertebrate species composition also varied on a seasonal basis. For example, no more than seven taxa were collected at a single station by beam trawls on any given month, while the species composition generally ranged between 22 and 37 per station. This is likely due to a high turnover in species composition during seasonal cycles.

Common subtidal macroinvertebrates collected by MEC in 1992-93 and similarly expected at present included the California horn snail, the snail *Nassarius tegula*, the shrimp *Palaemon ritteri*, the white bubble snail *Haminoe vesicula*, crayfish (F. Astacidae), and water boatmen (F. Corixidae), the latter being found in more brackish habitats upstream. During 1998 (this study), a colony of fiddler crabs (*Uca crenulata*) was also observed in a small area of mud flat along the south bank of the river channel, and swimming crabs (*Portunus xantusii*) were abundant in shallow submerged habitats along the river.

Algae occur in the lagoon on a seasonal basis, more frequently during spring and summer months, and in the upstream, brackish areas (MEC 1993). Eelgrass (*Zostera marina*), a flowering plant that forms extensive beds in shallow water in many west coast bays and estuaries, is absent from the lagoon, probably as a result of a combination of lack of tidal flushing in the more protected areas and scouring by stormwater runoff in the main channel. Where present elsewhere, eelgrass beds provide an extremely productive habitat and support a high diversity of invertebrates and fishes, including juveniles that utilize eelgrass beds as a nursery and refuge from predation.

Table 2.11. Most Common Subtidal Infaunal Invertebrate Species Collected at San Dieguito Lagoon Before (November 1992) and After (April 1993) a Major Rainfall Event (MEC 1993)

	November 1992			April 1993		
Habitat	***Taxon***	***Mean per m²***	***Percent***	***Taxon***	***Mean per m²***	***Percent***
Outer Tidal Channel	Capitella “capitata”	3875.0	36.3	Chironomidae larva	1006.9	78.8
	Cylichnella inculta	1236.1	11.6	Oligochaeta	208.3	16.3
	Polydora nuchalis	1166.7	10.9	*Polydora ligni*	27.8	2.2
	Nematoda	111.1	10.4	*Polydora* spp.	13.9	1.1
	Corophium sp.	972.2	9.1	*Boccardia probosoidea*	13.9	1.1
Inner Tidal Channel	Capitella “capitata”	5680.6	21.6	Oligochaeta	2791.7	68.3
	Streblospio benedicti	5222.2	19.9	Capitella “capitata”	680.6	16.6
	Phoronida	4236.1	16.1	Chironomidae larva	263.9	6.5
	Cylichnella inculta	3861.1	14.7	*Streblospio benedicti*	166.7	4.1
	Oligochaeta	3027.8	11.5	*Grandidierella japonica*	41.7	1.0
Tidal Creeks	Cylichnella inculta	3472.2	25.4	Oligochaeta	5805.6	58.1
	Capitella “capitata”	3069.4	22.4	Capitella “capitata”	1722.2	17.2
	Polydora nuchalis	3055.6	22.3	Phoronidae	944.4	9.4
	Oligochaeta	2166.7	15.8	Cylichnella inculta	500.0	5.0
	Tagelus subteres	430.6	3.1	*Streblospio benedicti*	250.0	2.5
Open Saline Ponds	Capitella “capitata”	5125.0	42.0	Oligochaeta	16708	89.8
	Cylichnella inculta	2805.6	23.0	Capitella “capitata”	819.4	4.4
	Polydora nuchalis	1861.1	15.3	*Polydora nuchalis*	541.7	2.9
	Tagelus subteres	930.6	7.6	Chironomidae larva	388.9	2.1
	Oligochaeta	361.1	3.0	Tagelus subteres	41.7	0.2
Brackish Water	Polydora nuchalis	868.1	39.7	Chironomidae larva	538.2	80.3
	Hydrobiidae	527.8	24.1	Oligochaeta	41.7	6.2
	Capitella “capitata”	402.8	18.4	Hyalella azteca	41.7	6.2
	Cylichnella inculta	159.7	7.3	Aphididae adult	41.7	6.2
	Oligochaeta	104.2	4.8	Miridae adult	6.9	1.0

2.5.2.3 Fishes

The San Dieguito Lagoon provides a protected shallow water habitat for a variety of marine, estuarine, and freshwater fishes. The periodic submergence of tidal mudflats and wetlands affords access to productive foraging grounds for fishes, and the intermingling of open water and vegetated wetlands provide nursery areas for many marine species (MEC 1993). Such areas are of limited extent in the lagoon in its current state due to the confinement of tidal exchange to a small fraction of its historic extent, and to relatively steep banks and the scarcity of small tidal creeks along the lagoon's shorelines. The fish fauna of the lagoon changes seasonally as river flows transport freshwater species downstream and cause reduced salinities that strictly marine species cannot tolerate. The effects of seasonal and long-term variations in freshwater flows are amplified by the closure of the mouth of the lagoon. Prolonged closure results in hypersaline conditions west of I-5, and predominantly freshwater conditions east of I-5 (MEC 1993).

Historical information about the fish species composition and diversity in San Dieguito Lagoon is reported in Carpelan (1960), Greenwald (1984), PSBS (1979), and MEC (1993). Carpelan (1960) reported collecting topsmelt, California killifish, and mosquitofish (*Gambusia affinis*). Greenwald (1984) collected 21 fish species including California killifish, topsmelt, longjaw mudsuckers (*Gillichthys mirabilis*), striped mullet (*Mugil cephalus*), and mosquitofish. Of these species, topsmelt was the most common, comprising approximately 63 percent of the catch. Similar species composition was found by MEC (1993). Several other fish species collected by PSBS (1979) and Greenwald (1984), but not MEC (1993) included bay pipefish (*Syngathus leptorhynchus*), California corbina (*Menticirrhus undulatus*), halfmoon (*Medialuna californiensis*), opaleye (*Girella nigricans*), and walleye surfperch (*Hyperprosopon argenteum*). Species reported only by MEC (1993) included barred pipefish (*Syngnathus auliscus*), bat ray (*Myliobatis californica*), bluegill (*Lepomis macrochirus*), brown smoothhound shark (*Mustelus henlei*), California grunion (*Leuresthes tenius*), California needlefish (*Strongylura exilis*), jacksmelt (*Atherinopsis californiensis*), northern anchovy (*Engraulis mordax*), queenfish (*Seriphus politus*), and white croaker (*Genyonemus lineatus*).

Recent sampling in winter (December 1997) and spring (May 1998) at both river and basin sites resulted in a total of 19 species and unidentified individuals from two families, Atherinidae (silversides) and Gobiidae (gobies) (Schroeter et al. 1998) (Table 2.12). The most abundant species (number per 100 m^2) collected in the open water basins in winter 1997 were topsmelt and miscellaneous gobies, while deepbody anchovy, topsmelt, and longjaw mudsuckers were most abundant in spring 1998. Results were different at the river sites, with striped mullet (*Mugil cephalus*), topsmelt, and mosquitofish being most abundant in winter 1997. Spring 1998 sampling at river sites resulted in topsmelt being the most abundant fish species. Other common species collected during spring 1998 at river sites included striped mullet, California halibut, and yellowfin goby (Schroeter et al. 1998).

Table 2.12. Fish Species Collected in San Dieguito Lagoon (1979-1998)

Common Name	***Scientific Name***	**STUDIES**			
		PSBS (1979)	***Greenwald (1984)***	***MEC (1993)***	***Schroeter et al. (1998)***
Brown smoothhound	*Mustelus henlei*			X	
Round stingray	*Urolophus halleri*				
Bat ray	*Myliobatus californica*			X	
Threadfin shad *	*Dorosoma petenense*		X	X	X
Northern anchovy	*Engraulis mordax*			X	
Deepbody anchovy	*Anchoa compressa*		X	X	X
Carp *	*Cyprinus carpio*		X	X	X
California needlefish	*Strongylura exilis*			X	
California killifish	*Fundulus parvipinnis*	X	X	X	X
Mosquitofish *	*Gambusia affinis*	X	X	X	X
Topsmelt	*Atherinops affinis*	X	X	X	X
Jacksmelt	*Atherinopsis californiensis*			X	
California grunion	*Leuresthes tenius*			X	
Bay pipefish	*Syngnathus leptorhynchus*		X		X
Barred pipefish	*Syngnathus auliscus*			X	X
Staghorn sculpin	*Leptocottus armatus*	X	X	X	X
Arrow goby	*Clevelandia ios*		X		X
Bay goby	*Lepidogobius lepidus*				X
Shadow goby	*Quietula y-cauda*		X		X
Cheekspot goby	*Ilypnus gilberti*	X			X
Yellowfin goby	*Acanthogobius flavimanus*		X	X	X
Barred sand bass	*Paralabrax nebulifer*				
Bluegill *	*Lepomis macrochirus*			X	
Queenfish	*Seriphus politus*			X	

Table 2.12. Fish Species Collected in San Dieguito Lagoon (1979-1998)

Common Name	***Scientific Name***	**STUDIES**			
		PSBS (1979)	***Greenwald (1984)***	***MEC (1993)***	***Schroeter et al. (1998)***
California corbina	*Menticirrhus undulatus*		X		
White croaker	*Genyonemus lineatus*			X	
Opaleye	*Girella nigricans*	X	X		
Halfmoon	*Medialuna californiensis*		X		
Striped mullet	*Mugil cephalus*	X	X	X	X
Barred surfperch	*Amphistichus argenteus*	X			
Shiner surfperch	*Cymatogaster aggregata*		X	X	
Walleye surfperch	*Hyperprosopon argenteum*		X		
Longjaw mudsucker	*Gillichthys mirabilis*	X	X	X	X
California halibut	*Paralichthys californicus*		X	X	X
Diamond turbot	*Hypsopsetta guttulata*	X		X	X

Note: * Non-native species that are washed into the lagoon by freshwater flows.

Mean fish abundances were lower in open water habitats such as intertidal channel and tidal creeks (300 individuals/100 m^2) than in brackish water areas and open saline ponds (500-600 individuals/100 m^2) (MEC 1993). Similar to intertidal and subtidal invertebrates, seasonal differences in species composition were reported by MEC (1993). For example, yellowfin goby (*Acanthogobius flavimanus*), other small gobies (Gobiidae), and several marine species were replaced by estuarine species such as barred pipefish, California killifish, longjaw mudsucker, mosquitofish, and topsmelt during the summer months. All fish species except mosquitofish, showed a seasonal decrease in abundance during the fall and onset of the rainy season while the mouth was open (MEC 1993). Fish diversity (number of species) also showed seasonal trends, with more species being collected during spring and summer months (April to October) than in the winter months. This is primarily due to lowered salinity levels when the mouth was closed to tidal circulation (December 1992), or during rainy months (October to February).

Mudflat habitats are generally rich in inorganic nutrients and organic food. Macro-invertebrates such as polychaetes, snails, and crabs use the mud flat habitats, as well as other intertidal salt mash areas during both high and low tides to filter food from the circulating water and search for other prey items. At high tide, several fish species occupy the lower mud flats, including California killifish, bay goby, striped bass, and topsmelt. In contrast, most of these fish species move out of the mud flats into deeper channel waters at low tide. One exception is bay gobies, which hide in their burrows on the mud flats between tides.

California grunion are common offshore and spawn on sandy beaches at high tides. They were collected in the outer tidal channel habitat (MEC 1993) and may spawn on the sandy intertidal beach surrounding the mouth of the lagoon.

2.5.2.4 Birds

Open water habitats in combination with tidal and non-tidal flats and vegetated wetlands at San Dieguito Lagoon are regionally important foraging and resting areas for water-associated migratory birds along the Pacific Flyway, as well as for summer-resident and breeding species. The open water habitat provides resources for species that forage on vegetation (American coot, American widgeon, cinnamon teal, gadwall, lesser scaup, mallard, northern pintail and northern shoveler) and invertebrates (white-faced ibis, bufflehead, pied-billed grebe and ruddy duck [MEC 1993]). Grebes, cormorants, pelicans, herons, egrets, gulls, terns, osprey and belted kingfisher all frequent the open water habitat to hunt for fish and tadpoles (in freshwater). This habitat is also important for cliff swallows, which forage for flying insects over the open water and which nest in the hundreds under the I-5 bridge (SAIC unpublished field notes).

Many of the waterfowl and shorebird species associated with open water habitat are winter visitors in Southern California, so the total number of birds utilizing the open water habitat on the project area is highest in winter. This area is important during the breeding season for some species, especially Forster's, Caspian, and California least terns (an endangered species). These species use the open water habitat for foraging and may breed in the project area during some years. Terns forage primarily over the open water of estuarine, palustrine, and riverine habitats. California least terns forage primarily in the open water habitats. Many species, especially gulls, pelicans, and some shorebirds, bathe in open water areas to maintain the integrity of their feathers. Some species of ducks, grebes, and other species may rest during the day or roost at night on the water surface, although the surrounding vegetation is often preferred.

Intertidal mudflats are important foraging areas for most shorebirds, as well as herons and egrets, ibis, and, to a lesser extent, gulls. These habitats are limited in the lagoon at present and occur at the river mouth, around the edges of salt marsh in the southwest part of the restoration area, and in narrow zones adjacent to the river banks. Shallow water and mudflat habitats in non-tidal basins east of I-5 are also heavily used by shorebirds and waterfowl. The worms, arthropods, snails and other invertebrates found in the mud flats attract large numbers of shorebirds during their annual migrations. Hundreds of sandpipers, dowitchers, dunlin, willet, whimbrel, marbled godwit, and other shorebirds are observed in the saltmarsh habitat along the channels and mudflats every spring and fall (MEC 1993). Many of these species overwinter in the project area.

2.5.3 Salt Marsh

2.5.3.1 Vegetation

This habitat type is essentially synonymous with "Southern Coastal Salt Marsh" as the term is widely used (Holland 1986) to define the vegetation that occurs within the range of regular (daily) to irregular (less often than daily) flooding by high tides (Ferren et al. 1995). In the project area, this corresponds to elevations between approximately +1.5 and +5 feet NGVD. The lower part of this range overlaps with unvegetated channel banks and flats as discussed previously, and the upper part includes unvegetated saline flats (non-tidal estuarine flats in Figure 2.19). The upper end of this range (roughly +4.5 to +5 feet NGVD), where tidal inundation occurs less than once a year on average (Jenkins and Wasyl 1999b), represents a transition zone between tidal wetlands and non-tidal upland or seasonal wetland habitats.

Salt marsh vegetation typically exhibits vertical zonation, in which different dominant species or groups of species consistently occur within a particular elevational zone. This reflects the differing tolerances, growth, and reproduction of the constituent species in response to changing physical (and presumably biological) factors along the elevational gradient. At the lower limit of salt marsh vegetation, temperature and salinity conditions are relatively stable (although this stability is disrupted when tidal exchange is blocked), but vascular plants must contend with permanently saturated, anaerobic soil conditions, as well as currents and wave action when they are submerged. Higher on the shore, periods of tidal flooding occur less frequently and are of shorter duration, resulting in greater variation in temperature and soil moisture. Soil salinity is also more variable due to seasonal cycles of rainfall and drought, with hypersaline conditions developing during summer-fall. Substrate qualities also influence the development of the vegetation within a particular zone. Sandy soils, for example, drain more rapidly and do not retain nutrients to the same degree that finer soils do. Sandy soils are less conducive to the establishment of salt marsh vegetation (Zedler 1996b).

Salt marsh habitats are critical sources of primary and secondary production for California estuaries, and they support a high concentration of native plant and animal species, some of which are rare or endangered. Salt marsh vegetation is characterized by a dense growth of native herbaceous, semi-succulent, and/or suffrutescent (semiwoody, shrublike) species that form an essentially continuous cover 1 to 3 feet in height. The most common and characteristic species is pickleweed (*Salicornia virginica*). Three subtypes of salt marsh — low, middle, and high — can be distinguished on the basis of elevation (which determines frequency of tidal flooding) and dominant plant species, as described below.

Low Salt Marsh

Low salt marsh, and the adjacent edges of intertidal mudflats and channel banks, typically occur in the vicinity of mean high water where the shoreline is alternately exposed by low tides and inundated by high tides on a daily basis. Typical elevations for low salt marsh are +1.3 to +2.2 feet NGVD. Low marsh vegetation is characterized by Pacific cordgrass (*Spartina foliosa*), which is generally missing from Southern California estuaries that do not have good tidal flushing (Zedler 1982). The occurrence of low marsh vegetation in the project area is limited to a successful reintroduction along the north shore of the lagoon (L-1 on Figure 2.19). Observations during 1998 confirmed that cordgrass had been expanding around the area of introduction though the area of plant coverage appears to contract significantly during periods of long closure. The filling of most of the historic tidal marsh in the lagoon and the subsequent history of lagoon closures may have caused the extirpation of cordgrass elsewhere in the lagoon. Another consideration is that most remaining areas, particularly along the river, generally lack sheltered, gently sloping mudflat-marsh transition zones at the elevations that would be most suitable for low marsh establishment.

Middle Salt Marsh

Middle salt marsh occurs within the zone of irregular (less than daily [Ferren et al. 1995]) flooding by the higher high tides, and is typically dominated by pickleweed. Typical elevations for middle marsh are +2.2 to +3.8 feet NGVD, although middle and high marsh communities intergrade, especially where topography is irregular, up to elevations of +4.5 feet in the project area. This marsh type includes many areas where the vegetation is patchily dominated by species other than pickleweed, especially alkali heath (*Frankenia salina*), glasswort (~~*Salicornia subterminalis*~~*Arthrocnemum subterminale*), fleshy jaumea (*Jaumea carnosa*), and salt grass (*Distichilis spicata*). Some investigators would consider these areas to be "high salt marsh," however, notwithstanding, the boundary between middle and high salt marsh in the project area is indistinct (see below). Both vegetation types occur together on gently sloping benches or platforms that rise abruptly above surrounding channel and mudflat habitats.

The largest areas of middle salt marsh are around the periphery of the lagoon and adjacent to the channel leading to the lagoon. Smaller patches of the habitat type also occur between I-5 and the railroad right-of-way and along the banks of the San Dieguito River inland nearly to El Camino Real (Figure 2.19).

High Salt Marsh

High salt marsh intergrades with middle salt marsh, but typically extends from +3.8 to +4.5 feet NGVD, the latter being near the upper limits of tidal flooding. The transition between middle and high marsh within this range is often indistinct, but is generally marked by the decreasing dominance of pickleweed and increasing diversity of other species.

An upper transition zone between about +4.5 and +5 feet NGVD is frequently occupied by high salt marsh vegetation in the study area, but this zone may also support non-tidal upland or seasonal marsh habitats. However, the vegetation is still subject to tidal influence where the underlying soils become saturated by tidal flooding. Where the soils are on slopes or benches not subject to seasonal ponding or tidal saturation from below non-native, weedy species are more prevalent in this transition zone. Non-tidal, seasonal flooding in small basins or drainage areas within this zone can blur the distinction between seasonal and high salt marsh since many of the same species found in high salt marsh (e.g., pickleweed, glasswort, and salt grass) also occur on seasonally flooded saline soils.

The upper boundary, between high salt marsh and adjacent habitats not subject to tidal influence is fairly sharp in many areas due to the existence of low levees or abrupt transitions between stream terraces around the upper edges of the tidal salt marsh throughout the project area. The levees located on the north side of the confluence between the main river channel and the channel leading southward to the lagoon rise abruptly to 2 to 3 feet above from salt marsh elevations and are typically vegetated by introduced weedy species.

In addition to the species mentioned for middle salt marsh, high salt marsh vegetation includes several distinctive native species, including sea lavender (*Limonium californicum*), spearscale (*Atriplex triangularis*), salt marsh sand spurry (*Spergularia marina*), woolly sea blite (*Suaeda taxifolia*), alkali bulrush (*Scirpus maritimus*), and spiny rush (*Juncus acutus*); the latter two species are often associated with freshwater inflow. Several naturalized non-native species may be present at the upper edges of the high salt marsh, and become increasingly common as elevation increases in transitional habitats above +4.5 feet NGVD. These include rabbitsfoot grass (*Polypogon monspeliensis*), sickle grass (*Parapholis incurva*), and iceplant (*Mesembryanthemum nodiflorum*). Salt pans or unvegetated flats that are flooded by the highest tides are interspersed with vegetated areas within the high salt marsh.

2.5.3.2 Fishes and Invertebrates

Fishes and invertebrates utilize the salt marsh for a variety of activities, including feeding, reproduction (nursery grounds), and protection against predation (Zedler 1982). The salt marsh fish and invertebrate communities in many Southern California embayments and lagoons, including San Dieguito, are fairly similar in species composition, although open systems are more diverse than lagoons subject to frequent closure (MEC 1993). Macroinvertebrates such as polychaetes, snails, and crabs use intertidal salt marsh areas during both high and low tides to filter food from the circulating water and search for other prey items. Several fish species, including California killifish, bay goby, striped bass, and topsmelt move into these highly productive habitats to forage at high tide. Habitat use by marine species is disrupted during periods of lagoon inlet closure, when the salt marsh is likely to either be inaccessible (and desiccated) due to prolonged exposure, or subject to stagnant conditions or fresh water inflows which are inhospitable to marine species (MEC 1993).

Numerically dominant benthic organisms in this habitat includes annelid worms such as polychaetes and oligochaetes *(Capitella capitata, Pseudopolydora paucibranchiata*, and *Streblospio benedicti*), arthropods (gammarid and caprellid amphipods, isopods, ostracods, and cumaceans), and molluscs (gastropods and pelecypods) (SAIC 1997). Most of these organisms are widely distributed in many California coastal bays and estuaries. The most abundant surface-dwelling invertebrates typically found on mudflats comprising lower salt marsh are horn snails (*Cerithidea californica*), salt marsh snails (*Melampus olivaeceous*), yellow shore crabs (*Hemigrapsus oregonensis*), and lined shore crabs (*Pachygrapsus crassipes*) (Zedler 1982). Scripps Institution of Oceanography (SIO) recently compared structure and function in Southern California coastal wetlands and found that macrofaunal assemblages in most marsh systems were dominated by oligochaetes, representing approximately 54 to 89 percent of the individuals greater than 300 microns (SIO 1995). Polychaete species, representing 10 to 20 percent of the fauna at each site were typified by *Polydora ligni*, *S. benedicti*, and *Capitella*.

2.5.3.3 Wildlife

Coastal salt marsh habitat does not support many non-avian wildlife species primarily due to regular tidal inundation. This habitat is typically characterized by the prevalence of pickleweed. Pickleweed stands constitute the most important habitat for Belding's savannah sparrow, a state-listed endangered species. This habitat also supports seed-eating species such as house finch and song sparrow and insectivorous birds such as black phoebe, cliff swallow, and northern mockingbird (MEC 1993). Birds of prey, such as American kestrel, red-tailed hawk, white-tailed kite, northern harrier, and loggerhead shrike, hunt from the air or from high perches over the entire project area, including the salt marshes. Herons and egrets forage from the aquatic edge of the salt marsh, primarily hunting fish in the adjacent water. Some shorebirds and wading birds that forage in the tidal mudflats will move upward and forage in adjacent salt marsh during high tides when the mudflats are submerged. Macroinvertebrates, such as the salt marsh snail, yellow shore crabs, and lined shore crabs, that live in the vegetated marsh are eaten by willets and other shorebirds. The high marsh zone, including unvegetated salt pans, along with adjacent transitional and upland habitats, is typically used as a high tide loafing area by most shorebirds and wading birds that forage on exposed tidal flats or salt marsh habitats nearby.

Regions of high salt marsh and adjacent transition zones that are partially vegetated with upland species support species such as western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), and various rodent species, if the areas are large enough or connected to other upland habitat. Montgomery (SJM Biological Consultants 1994) reported trapping southern harvest mouse (*Reithrodontomys megalotis*), house mouse (*Mus musculus*), and deer mouse (*Peromyscus maniculatus*) in the high salt marsh habitat on the project site.

2.5.4 Seasonal Marsh

2.5.4.1 Vegetation

Seasonal marsh habitats are non-tidal wetlands and transitional (wetland-to-upland) habitats that are flooded to varying degrees by seasonal rainfall and runoff. These habitats typically occur on flats or in shallow basins where drainage is poor and soils are saline, either because of historical connections to the San Dieguito River estuary, or because of the concentration of salts during cycles of flooding and evaporation. As a result, seasonal marsh vegetation is often characterized by salt-tolerant species that include the typical (tidal) high salt marsh plants mentioned previously, as well as other species often associated with disturbed wetlands or saline soils, such as curly dock (*Rumex crispus*), cocklebur (*Xanthium strumarium*), tamarisk (*Tamarix* sp.), heliotrope (*Heliotropium curassavicum*), and toad rush (*Juncus bufonius*). Weedy, non-native annual grasses, currently present around the upper, drier edges of the flats and basins that support seasonal marsh, were probably more abundant in the aftermath of drought when the 1992-93 field surveys occurred (MEC 1993).

Habitats previously identified and mapped as seasonal salt marsh and seasonal salt marsh — transitional (MEC 1993) are combined within this habitat type, as are adjacent areas mapped as palustrine or riverine flats. All of these areas occur above +4.5 feet NGVD. Field investigations in 1998 indicated that these habitat types overlap and that their separation is somewhat arbitrary. In addition, the vegetation of these habitats can change significantly in response to years of drought or heavy (e.g., El Niño influenced) rainfall, blurring the distinctions between seasonal marsh and seasonal marsh-transition areas.

As noted previously, the transition zone between +4.5 and +5 feet NGVD can support seasonal or tidal high salt marsh, or non-wetland habitats, depending on local soil and drainage conditions. Seasonal marsh habitats on the project site are heterogeneous and occur in several different locations, which are distinct in terms of history as well as present-day vegetation and ecological functions and values. The more noteworthy areas are as follow:

- Between the lagoon and the river channel, an area of now-diked but formerly tidally influenced middle to high salt marsh is mapped as seasonal marsh (S-1 in Figure 2.19). This area is seasonally flooded by rainfall, and may also be subject to spillover flooding during high water levels that result from a combination of river flooding and high tides. This area retains middle-to-high salt marsh vegetation and, if not for the low dikes that surround it, would provide a prime example of a gradual transition from tidal salt marsh to adjoining upland habitats.
- The construction of I-5 isolated two “arms” of the historic lagoon and adjacent flats on the south side of the river, east of I-5 (S-2 in Figure 2.19). Rainfall and runoff from the surrounding hills to the south and east now accumulate in a deep, permanent pond in the northern arm, and in a shallower, more seasonal pond in the southern arm. These ponds, although non-tidal, are fringed by typical tidal salt marsh species such as pickleweed, alkali heath, and glasswort. Bordering flats that in 1992-93 were mapped as agricultural or ruderal (MEC 1993) now support seasonal marsh as well; the habitat map has been updated to reflect current conditions.
- East of I-5 at the northern edge of the project area is an extensive area of seasonal marsh on old alluvial deposits at the northern edge of the river floodplain (S-3 in Figure 2.19). The large area that supports seasonal marsh is a shallow basin whose drainage to the river is impeded by the land (ruderal habitat) to the south, which is at slightly higher elevations. Prior to development of the area to the north, small drainages flowed into the river valley in this area, and the river channel apparently flowed through this area north of its present location (MEC 1993). The deposition of sediment on the old marsh plain resulted in above-tidal elevations, but the salinity of the soils and poor drainage result in the persistence of salt marsh vegetation, especially pickleweed, glasswort, and alkali heath.

- On its northern edge, the vegetation includes a greater prevalence of brackish wetland species, such as cocklebur, curly dock, nut-sedge (*Cyperus eragrostis*), and bulrushes (*Scirpus* spp.). These species are common where freshwater runoff from the now-developed shopping center to the north is impounded in ditches and/or by old graded roadways. Seasonal marsh to the south is drier and includes salt pans (previously mapped as palustrine flats) located in shallow, seasonally ponded low areas that meander through vegetated "islands" of pickleweed and glasswort.
- Seasonal marsh habitat also occurs on a sand bar "island" associated with a river meander in the eastern part of the project area (S-4 in Figure 2.19). This area was originally mapped as seasonal salt marsh — transitional (MEC 1993), and it is situated between tidally influenced middle and high salt marsh and ruderal upland habitat. The vegetation is a heterogeneous assemblage of both wetland and non-wetland species that includes sandbar willow (*Salix exigua*), tamarisk, beach primrose (*Camissonia cheiranthifolia*), telegraph weed (*Heterotheca grandiflora*), and ripgut brome (*Bromus diandrus*).

2.5.4.2 Wildlife

There are four major portions of the project area containing seasonal marsh habitat (Figure 2.19). The seasonal marsh habitat associated with the upper portions of the historic lagoon (S-2 in Figure 2.19) provides some of the most diverse and valuable habitat for animal species on the project site. Several species of amphibians, reptiles, and birds live or forage in the area of this wetland habitat. Although there is evidence of halophytic vegetation in this area, both western toads (*Bufo boreas*) and Pacific tree frogs (*Pseudacris regilla*) breed in this habitat (MEC 1993, SAIC 1998 field observations). Because open water persists throughout the year, this area provides valuable summer habitat for these amphibians and other wildlife species as well.

Areas with persistent standing water would attract numerous mammal species including coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), and cottontail rabbit (*Sylvilagus audubon*i) (MEC 1993). Not only do animals come to these areas to drink, but this habitat should be valuable for foraging and breeding. California vole (*Microtus californicus*) and dusky-footed woodrat (*Neotoma fuscipes*) were both found in this habitat (SJM Biological Consultants 1994). Pools that support emergent aquatic vegetation provide resources for several waterfowl species including mallard, cinnamon teal, ruddy duck, and American coot; and pied-billed, horned, and eared grebes (MEC 1993, SAIC 1998 field observations). The seasonal marsh vegetation surrounding the open water supports numerous killdeer and black-neck stilts. Other avian species likely using this aquatic habitat include great blue, black-crowned night, and green herons; and snowy and great egrets. Raptors such as Cooper's hawk, osprey, and northern harrier frequently hunt here (SAIC 1998).

The two portions of seasonal marsh habitat located to the south (S-5 in Figure 2.19) and north (S-1 in Figure 2.19) of the lagoon and the seasonal marsh along San Dieguito River (S-4 in Figure 2.19) are primarily vegetated with pickleweed and support wildlife species similar to those described for the high salt marsh habitat. The seasonal marsh south of the lagoon provides especially good habitat for Belding's savannah sparrows; several family units were observed in this area during the SAIC surveys for this project (1998). The seasonal salt marsh habitat north of San Dieguito River (S-3 in Figure 2.19) contains more weedy species and grasses and is closer to urban development. Belding's savannah sparrows have been observed in this region (MEC 1993), but most of the other wildlife species generally expected to occur in this area are more tolerant of human disturbance. Montgomery (SJM Biological Consultants 1994) noted house mouse and southern harvest mouse in this area. Other wildlife species include western fence lizard, side-blotched lizard, cottontail rabbit, and Botta's pocket gopher (*Thomomys bottae*). Large burrow complexes of California ground squirrel (*Spermophilus beecheyi*) are present along the berm separating this area from a nearby parking lot.

2.5.4.3 Aquatic Biota

Aquatic portions within the seasonal marsh habitats at San Dieguito Lagoon hold water for highly variable periods, depending on the frequency and duration of rainfall, seasonal temperatures, and site topography. During flooded conditions, unicellular and colonial/filamentous algae may become abundant in these pools. These non-vascular plants are valuable in terms of primary productivity and as a food resource for invertebrates.

The most conspicuous aquatic inhabitant of the ephemeral pools within the seasonal marsh is the water boatman (Insecta, family Corixidae). Corixids feed on a wide variety of plant and animal matter, including diatoms, filamentous algae, rotifers, and other small planktonic animals. Corixids also prey upon mosquito larvae (Usinger 1956), which were noted in increasing numbers in the higher reaches of the seasonal marsh. The dominance by corixids is consistent with observations of this species in brackish, seasonally inundated areas elsewhere, and within other Southern California coastal lagoons closed to regular tidal flushing. For example, Nordby (1990) found corixid and midge larva to be the most abundant organisms in San Elijo Lagoon, an adjacent lagoon system to the north, that is typically closed to tidal influence. Additionally, corixids were a dominant invertebrate represented at Batiquitos Lagoon prior to restoration of that system (Michael Brandman Associates 1988).

In addition to the corixids and mosquito larva (family Culicidae), other common organisms observed were dipteran larva and adults, predaceous diving beetles (family Dytiscidae), ostracods, and harpacticoid copepods (Crustacea, Harpacticoida). Adult diptera (e.g., midges) were also common around the water edges. Other aquatic animal groups expected to occur within seasonal marsh habitat include polychaete and oligochaete worms. Depending on environmental conditions, food resources, and predators, the density of the above organisms can fluctuate widely. However, the number of species represented in these ephemeral conditions is expected to be relatively low.

2.5.5 Fresh and Brackish Water Marsh

2.5.5.1 Vegetation

Fresh and brackish water marsh habitats occur along drainages or in basins that remain flooded for much of the year and may include significant areas of open water. Soil moisture is sufficient in these areas to support tall emergent vegetation such as cattails (*Typha latifolia*), and/or bulrushes (*Scirpus* spp.). The major examples of these habitats in the project area are as follows:

- Around the edges of the teardrop-shaped pond east of I-5 (F-1 in Figure 2.19). The extent of marsh vegetation, especially tules (*Scirpus californicus*) in this location has expanded considerably compared to what was mapped in 1992-93 (MEC 1993). Willows have also grown rapidly around this pond in recent years.
- At the head of the lower arm of the historic lagoon described previously (near R-4 in Figure 2.19), where brackish marsh is transitional between seasonal marsh on the flats and downstream, and riparian woodland and scrub in the drainage upstream.
- Along the river, beginning near the upstream limit of tidal flux and continuing upstream beyond El Camino Real (F-2 in Figure 2.19). This location is noteworthy for the transition from riverine to estuarine conditions.
- In what is apparently an old meander channel of the river, near the northern edge of the project area (F-3 in Figure 2.19). At this location, three species of bulrushes (*Scirpus americanus*, *S. californicus*, and *S. maritimus*) are intermingled in the deeper areas of the remnant channel where surface water accumulates, while seasonal marsh occurs around the edges.
- Another area of freshwater marsh (primarily bulrushes) that occurs in a linear ditch that extends southward from behind the shopping center (F-4 in Figure 2.19). This habitat is supported by year-round runoff from a storm drain that terminates at the southeast corner of the shopping center.

2.5.5.2 Wildlife

The most important freshwater marsh habitats for wildlife include the teardrop-shaped wetland east of I-5, areas along San Dieguito River east of El Camino Real and within portions of an old drainage ditch running north to south, east of I-5. Brackish marsh is primarily found along San Dieguito River west of El Camino Real and within a portion of ruderal habitat south of Via de la Valle.

The freshwater habitat found at the teardrop-shaped wetland (F-1 in Figure 2.19) and along San Dieguito River east of El Camino Real (F-2 in Figure 2.19) is some of the most important in the project area in terms of food and cover for numerous wildlife species. The freshwater marsh in the drainage ditch running north to south, east of I-5 (F-4 in Figure 2.19) consists of only a narrow band of cattails and provides less cover and foraging for most wildlife species.

Brackish and freshwater marshes on site support the highest avian densities in the project area (MEC 1993). Birds occurring in the freshwater habitat along San Dieguito River and in the teardrop-shaped wetland include those described above under open water habitat, which includes species that forage for vegetation, invertebrates, and fish. Mosquitofish (*Gambusia affinis*) and tadpoles found in this habitat are prey for numerous species of wading birds including great blue heron, snowy egret, great egret, green heron, and black-crowned night heron (MEC 1993). The heavy cover of cattails and other aquatic vegetation provides roosting and nesting habitat for species such as mallard, American coot, pied-billed grebe, cinnamon teal, and ruddy duck (MEC 1993). Other avian species that commonly use this habitat for both foraging and nesting include marsh wren, common yellowthroat, and song sparrow. Shorebirds such as killdeer, sandpipers, yellowlegs, dunlin, and dowitchers roost and forage for invertebrates along the perimeter of the teardrop-shaped wetland and along

San Dieguito River. Belding's savannah sparrows were recorded utilizing the brackish marsh habitat along San Dieguito River up to the transition to freshwater marsh (SAIC 1998).

The freshwater marsh habitat supports Pacific tree frogs and western toads, both of which breed in San Dieguito River, the drainage ditch, and the teardrop-shaped wetland. Western spadefoot toads (*Spea = [Scaphiopus] hammondii*), a California Species of Concern (CSC), have been observed on site and marginal habitat for this species is present at the teardrop-shaped wetland and along the sandier portions of the river. Reptile species found in the vegetation surrounding both freshwater and brackish marshes include western fence lizard, side-blotched lizard, gopher snake (*Pituophis melanoleucus*), and common kingsnake (*Lampropeltis getulus*) (MEC 1993). The freshwater habitat is also suitable for southwestern pond turtles (*Clemmys marmorata*), which is a Federal Species of Concern (FSC) and CSC. Although this species has not been observed on site, this turtle has been recorded in San Dieguito River upstream of the project area.

Mammal species such as raccoon, striped skunk, feral cat (*Felis catus*), long-tailed weasel (*Mustela frenata*), coyote, and opossum use this rich habitat for hunting and scavenging. Other mammals found in the thick vegetation typical of this habitat type include California vole (SJM Biological Consultants 1994), cottontail, and deer mouse.

2.5.5.3 Aquatic Biota

Few if any differences are expected between the aquatic plants and animals species identified above for the seasonal marsh and areas specified as fresh and brackish water. Corixids and dipteran larvae are likely to be the most abundant organisms in brackish water marsh, with ostracods and beetles (dytiscids) well represented during periods of non-tidal inundation.

Freshwater marshes support the majority of animal groups previously discussed, although the component species may differ slightly and some species of mosquito larvae may occur in higher numbers in freshwater conditions. Another characteristic species identified in freshwater habitat is a non-native crayfish, *Procambarus clarki*, which has become well established in coastal Southern California streams and ponds. Where freshwater occurs either in streams or at ponded locations within seasonal streams, non-native fish including mosquitofish, green sunfish (*Lepomis cyanellus*), and possibly largemouth bass (*Micropterus salmoides*) are intermittently represented. During periods of heavy runoff, other fish species from upstream can move into the lagoon environment. These include common carp (*Cyprinus carpio*), brown bullhead (*Ictalurus nebulosus*), and threadfin shad (*Dorosoma petenense*). Areas of on-site freshwater marsh have also been documented to support the Pacific chorus frog and California toad (*Bufo boreas halophilus*).

2.5.6 Riparian/Southern Willow Scrub

2.5.6.1 Vegetation

Riparian and southern willow scrub habitats in the project area consist of stands of willows (*Salix* spp.), mulefat (*Baccharis salicifolius*), arrow weed (*Pluchea sericea*), and occasional cottonwood trees (*Populus fremontii*). They occur under low-salinity conditions in ponds and streams, often in association with fresh and brackish water marshes. Heavily disturbed sites often support non-native tamarisk as well. These habitats are of limited extent in the project area, although they are more common immediately upstream. Their major occurrences are as follow:

- Around the northeast edge of the "teardrop" pond (F-1 in Figure 2.19) east of I-5, a stand of willows mixed with mulefat and a few cottonwoods has grown rapidly in response to plentiful rainfall in recent years, providing a wooded canopy that overlooks the marsh and open water habitats of the pond.
- Beginning at the project area boundary and extending upstream in the southern arm of the historic lagoon (near R-4 in Figure 2.19), there is an extensive wooded area of willows and mulefat, with scattered eucalyptus trees. Downstream, the habitat grades into brackish and seasonal marsh associated with a large, shallow basin that provides seasonal open water and mudflats.
- A few patches of riparian scrub vegetation, including occasional tamarisks and one thicket of arrow weed, occur along the banks of the river, beginning near the Horsepark property (area near F-2 in Figure 2.19) and continuing to El Camino Real and beyond.
- Near the terminus of San Andres Drive, a small patch of willows has grown in response to freshwater flows from a storm drain outfall.

2.5.6.2 Wildlife

The willow riparian and mulefat scrub habitats are restricted to small portions of the project area, primarily the habitat extending eastward from the historic upper lagoon east of I-5. The major portion of this habitat is actually outside of the project footprint. However, because the project area surrounds this habitat and some wildlife species utilizing this habitat will move into habitats inside the project footprint, a more detailed description of this habitat is provided.

This habitat, especially where willows dominate, provides areas for cover, foraging, breeding, nesting, and natural perch sites for numerous species that also use most of the other habitat types on site. Habitat value increases with increasing height and density of the vegetation. Several avian species are closely associated with willow stands including insectivore (orange-crowned warbler, yellow-rumped warbler, Wilson's warbler, common yellowthroat, black phoebe, ruby-crowned kinglet, and plain titmouse), and seed eaters (song sparrows, house finch, and American goldfinch). This area provides suitable habitat for nesting least Bell's vireo, an endangered species. One individual was observed during a 1998 survey for this project (Merkel & Associates 1998). It could not be determined whether breeding was occurring. Great horned owls and barn owls may roost in these habitats during the day. During spring and summer, this habitat supports breeding by yellow-breasted chat (CSC), warbling vireo, common bushtit, Anna's hummingbird, Nuttall's woodpecker, mourning dove, brown-headed cowbird, Bullock's oriole, goldfinches, and house wren. Cooper's hawk (CSC) and white tailed kite (a "special" status animal) forage and are likely breeders in the thicker stands of willows (SAIC 1998). Other raptors common to the project area include red-tailed hawk, red-shouldered hawk, northern harrier (CSC), and American kestrel (MEC 1993). The willows in the project area also provide valuable habitat for birds migrating through the area including warblers, flycatchers, buntings, and some species of sparrows. It is probably also used occasionally by California gnatcatchers.

Rodent species, including the dusky-footed woodrat (*Neotoma fuscipes*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), deer mouse, and western harvest mouse were identified in this habitat (SJM Biological Consultants 1994). These rodent species and others such as ground squirrels and Botta's pocket gopher attract larger predators including coyote, long-tailed weasel, and feral cat. Other mammals frequenting the riparian area include raccoon, opossum, striped skunk, mule deer, and rabbits, all of which use this habitat for browsing and cover (field observations, SAIC 1998). Larger mammals use riparian habitat as a corridor to move between different areas.

Several reptile species expected to be common within or adjacent to the riparian corridor include gopher snake, western rattlesnake (*Crotalus viridis*), western fence lizard, side-blotched lizard, and southern alligator lizard (*Elgaria [=Gerrhonotus] multicarinatus*).

2.5.6.3 Aquatic Biota

Areas of pooled water within riparian woodlands and scrub support species typical of the freshwater marsh discussed above, and which are common in coastal Southern California. These consist of aquatic insects in nymphal or larval state, as well as adults that may be either aquatic or terrestrial. Common examples are corixids, various beetles, and the larvae of dragonflies (Odonata), stoneflies (Plecoptera), and a diversity of dipteran species (flies, midges, and mosquitoes). Water striders (family Gerridae) were recorded in open water within the mature riparian woodland in the southeast portion of the study area. Crayfish were present in these areas as evidenced by their cast exoskeletons (field observations, Merkel & Associates 1998). The Pacific chorus frog was also identified in this habitat.

2.5.7 Ruderal/Successional and Agricultural

2.5.7.1 Vegetation

More than half of the project area supports ruderal/successional and agricultural habitats. This is a diverse grouping that includes areas where the native vegetation has been severely disturbed by human activities (e.g., disking, grading, or other means). Lands that are currently maintained for crop production are mapped separately (Figure 2.19) as active agricultural areas. In ruderal/ successional areas, the vegetation is in varying stages of recovery from past disturbance. Areas that have been chronically disturbed within recent years are at the "ruderal" end of the spectrum and support mostly non-native annual grasses and forbs and a few native species that opportunistically colonize open disturbed sites. At the "successional" end of the spectrum are areas that were last disturbed more than 5 to 10 years ago and, at least in some parts, are undergoing succession to coastal scrub or other native vegetation types. Areas mapped as ruderal/successional include in a few places "woody exotics" (MEC 1993), non-native trees or shrubs that were planted or apparently have escaped from plantings.

Ruderal examples of this habitat type are the former agricultural fields east of I-5 (R-1 through R-3 in Figure 2.19). These areas are subject to disking for weed control and tend to be dominated by herbaceous vegetation. This includes introduced annual grasses such as ripgut brome, wild oats (*Avena barbata*), and ryegrass (*Lolium multiflorum*), or weedy annual forbs like black mustard (*Brassica nigra*), iceplant (*Mesembryanthemum nodiflorum*), London rocket (*Sisymbrium irio*), prickly lettuce (*Lactuca serriola*), alkali mallow (*Malvella leprosa*), common tarweed (*Hemizonia fasciculata*), and alkali weed (*Cressa truxillensis*). Low areas where water drainage accumulates on the north side of the river support curly dock and wild rye (*Leymus triticoides*) (R-1 in Figure 2.19). Areas previously mapped (MEC 1993) as "seasonal salt marsh" and "seasonal salt marsh — transitional" on the south side of the river (R-2 in Figure 2.19) had been disked, and possibly drained by ditching as of 1998. Therefore, these areas are included as part of the ruderal/successional habitat. Two isolated pepper trees (*Schinus molle*, a non-native species) occupy a hilltop within ruderal habitat (R-3 in Figure 2.19).

The blufftop area of R-4 on the inland side of I-5 (Figure 2.19) is in active agriculture as of since 1999, but was previously ruderal. During field surveys in 1998, the steep, eroding slope along the western edge of the bluff was sparsely vegetated with scattered wild oats, coast goldenbush (*Isocoma menziesii*), fennel (*Foeniculum vulgare*), and common tarweed. The Del Mar aster (*Lessingia filaginifolia* var. *linifolia*), a sensitive plant species, was found there during the SAIC (1998) surveys.

West of I-5, in the area formerly occupied by the abandoned airfield, substantial reestablishment of native shrubs is occurring, suggesting an eventual succession to coastal scrub (R-5 in Figure 2.19). These shrubs primarily include coast goldenbush, but also California sagebrush (*Artemisia californica*) and quail bush (*Atriplex lentiformis*). A few pepper trees and native (though possibly planted on the site) elderberries (*Sambucus mexicana*) also occur in this area. Dense stands of spearscale were also noted in low areas. Patches of salt marsh vegetation, often with small salt pans intermingled, are scattered throughout this area, on graded flats associated with the abandoned airfield.

Adjacent to the diked high marsh discussed previously (R-6 in Figure 2.19), ruderal/successional habitat includes a stand of non-native myoporum (*Myoporum laetum*), probably planted at this location, a few dying tamarisks, and abundant coast goldenbush, intermingled with patches of salt marsh vegetation and small areas of salt pan. This area does not appear to have been graded or filled, unlike the area of the old airfield to the east, and may be a remnant of the historic wetland-to-upland transition zone.

2.5.7.2 Wildlife

Ruderal habitat and agricultural fields offer limited resources for most native wildlife species due to the level of repeated human disturbance. Most of this habitat in the project area is no longer being planted with crops, so the habitat is left undisturbed except for periodic mowing or disking. Several species that are associated with human disturbance, such as ground squirrel, pocket gopher, deer mouse, house mouse, and cottontail rabbit, can utilize the areas surrounding the agricultural fields or quickly recolonize the open spaces after disturbances such as mowing or disking have occurred. Evidence of ground squirrel and pocket gopher burrow complexes is common in these habitats throughout the project area (field observations, SAIC 1998).

Montgomery (SJM Biological Consultants 1994) reported house mouse, southern harvest mouse, and deer mouse at several trapping locations within the ruderal habitats on site.

These small mammals attract predators including coyote, feral cat, gray fox, long-tailed weasel, and several species of raptors. Herons and egrets normally are associated with wetland habitat, but they can also hunt small to medium-sized rodents in the ruderal habitat.

Reptile species documented in this habitat by MEC (1993) include side-blotched lizard, western fence lizard, orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*, FSC, CSC), and southern Pacific rattlesnake (*Crotalus viridis helleri*). Unpublished SAIC field notes (1998) also recorded coastal western whiptail (*Cnemidophorus tigris multiscutatus*, FSC) and common kingsnake. Diagnostic indications of the San Diego coast horned lizard (*Phrynosoma coronatum blaivillei*, FSC, CSC) were observed on dirt roads within this habitat (MEC 1993). Other reptile species expected to be present but not documented include gopher snake and red coachwhip snake (*Masticophis flagellum piceus*).

These habitats support a relatively small variety of avian species. A few bird species specialize in open grassy fields where they are relatively abundant. These include killdeer, horned lark, blackbirds, European starling, American crow, common raven, rock dove, and mourning dove. Depending on the presence of seed-bearing vegetation, this habitat can also be utilized by house finch, goldfinches, and sparrows. The habitat also supports a variety of insects, which attract flycatchers such as Say's phoebe.

Due to periodic disturbance typical of these habitats, their quality as foraging habitat changes significantly over time, slowly in the case of successional areas, rapidly in agricultural areas. The abundance and diversity of birds can therefore change substantially in the same place from one time to another. Canada geese, for example, are occasionally abundant in some agricultural fields, but may be entirely absent from other fields or at other times. During their annual migration in winter, hundreds of Canada geese have historically foraged in the agricultural areas east of I-5, attracted mainly by the barley and other crops grown there and the presence of nearby water and cover. According to a study conducted during the winter of 1993/1994 (USFWS 1994), Canada goose arrival to the project area was found to correspond to the availability of newly sprouted vegetation in the agricultural areas. The birds utilized non-native herbaceous plant species that began to grow prior to seeding crops and after agricultural clearing activities and rainfall (USFWS 1994). Due to the general lack of cover in disturbed and non-vegetated ruderal habitats and the episodic high level of human activity, these areas are rarely used for roosting, and almost never for avian breeding. Exceptions include rough-winged swallows observed nesting in cavities located along an eroded bank within the ruderal habitat area (SAIC unpublished field observations 1998) and some successional areas with thistle and other tall vegetation that may support some breeding. In addition, the stand of *Myoporum* found within the ruderal habitat (R-6 in Figure 2.19) supports breeding for several avian species. These include California towhee, northern mockingbird, Bewick's wren, and potentially white-tailed kites, which were observed exhibiting courtship behavior in this area several times during the SAIC (1998) surveys.

2.5.7.3 Aquatic Biota

Aquatic habitats are largely lacking from the extensive ruderal fields; however, following the initial rain of the 1998-99 wet season, small pools of water formed along dirt roads north of the river and immediately south of the shopping center on the east side of I-5. While the observed corixids and mosquito larva are expected inhabitants of these temporary pools, very low numbers of mosquitofish were also present in some pools. These fish presumably originated from the freshwater marsh and associated small ponded areas located to the east (off site). Temporary pools such as these, including those forming in road ruts, could also provide breeding habitat for the western spadefoot (*Spea [=Scaphiopus] hammondi*), which was reported by MEC (1993) from a small pond on the south side of the river, east of I-5.

2.5.8 Southern Coastal Foredunes

2.5.8.1 Vegetation

Southern Coastal Foredune habitat is restricted in distribution and limited in size within the project area. A small patch (approximately 5 acres) mapped as foredune is located adjacent to the Pacific Ocean west of I-5 and north of the river channel. Typical plants associated with this habitat include sand-verbena (*Abronia umbellata*), red sand verbena (*Abronia maritima*), and sea rocket (*Cakile maritima*). The habitat at this location is subject to frequent disturbance by flood events and heavy human use (MEC 1993) and supports a poorly developed plant community on flats or very low hummocks. No dunes are present.

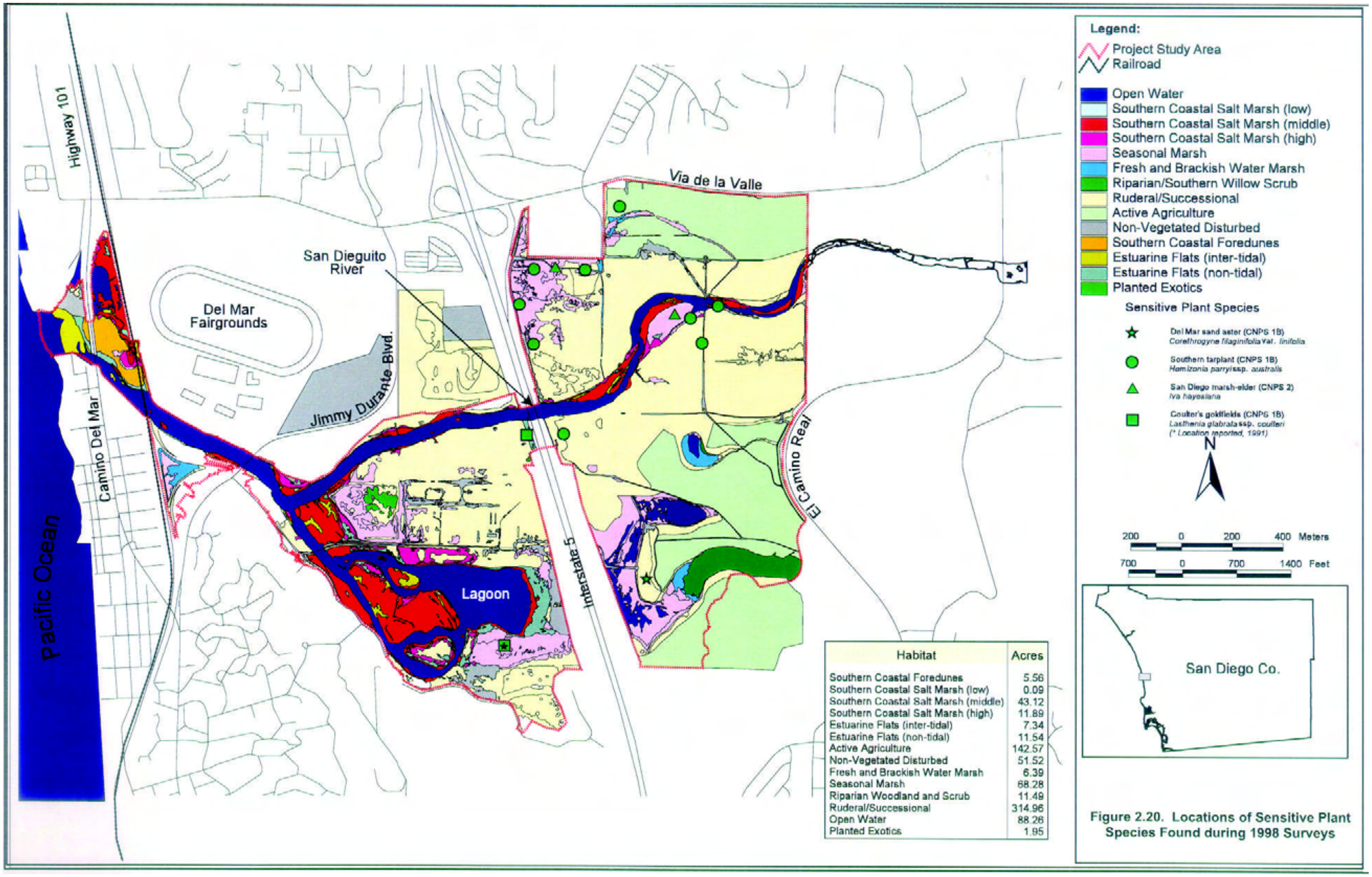
2.5.8.2 Wildlife

Foredunes in the project area occur only in an area bordered by San Dieguito River on the south, Camino Del Mar on the west, the train tracks on the east, and the salt marsh and lagoon on the north (Figure 2.19). This small patch of foredune habitat supports few wildlife species due to the proximity of roads and recreational areas and the lack of cover. Some wildlife species tolerant of human presence such as pocket gophers, western fence lizard, cottontail rabbit, and ground squirrel are expected to be present in low numbers. Other species including raccoon, feral cat, and coyote are expected to be present infrequently while foraging. Avian species include a few insect-eating birds such as Say's phoebe and shorebirds including black-necked stilt, willet, whimbrel, and dowitchers (field observations, SAIC 1998). Belding's savannah sparrows that were recorded in the nearby salt marsh habitat occasionally feed or rest in the foredune habitat (SAIC 1998). Gulls may also rest and preen here, as well as scavenge for food. When human use of the area including pets is at a peak, such as during summer and many warm weather days that can occur episodically throughout the year, the avian species would be less likely to be present.

2.5.9 Rare, Threatened or Endangered Species

The site-specific locations of sensitive plant species identified across the site are shown in Figure 2.20. The figure includes the following information.

- Federally or State-Listed and Proposed Threatened or Endangered Species
- California Native Plant Society (CNPS) List 1 B Plant Species (Rare and Endangered in California and Elsewhere)
- California Wildlife Species of Special Concern (identified by the California Department of Fish and Game)
- Other Sensitive Plant Species (CNPS Lists 2, 3, and 4)



Habitat	Acres
Southern Coastal Foredunes	5.56
Southern Coastal Salt Marsh (low)	0.09
Southern Coastal Salt Marsh (middle)	43.12
Southern Coastal Salt Marsh (high)	11.89
Estuarine Flats (inter-tidal)	7.34
Estuarine Flats (non-tidal)	11.54
Active Agriculture	142.57
Non-Vegetated Disturbed	51.52
Fresh and Brackish Water Marsh	6.39
Seasonal Marsh	68.28
Riparian Woodland and Scrub	11.49
Ruderal/Successional	314.96
Open Water	88.26
Planted Exotics	1.95

Figure 2.20. Locations of Sensitive Plant Species Found during 1998 Surveys

- Species of Local Concern (identified as sensitive in a variety of sources, as noted) and MSCP target species.

More detailed accounts follow for the following threatened or endangered species listed under the federal Endangered Species Act of 1973, as amended, or the California Endangered Species Act. There are no federally or state-listed endangered or threatened plant species on the site.

- Pacific Little Pocket Mouse
- California Brown Pelican
- California Least Tern
- Light-footed Clapper Rail
- Western Snowy Plover
- Coastal California Gnatcatcher
- Least Bell's Vireo
- Belding's Savannah Sparrow

Pacific Little Pocket Mouse

The Pacific little pocket mouse (*Perognathus longimembris pacificus*) was emergency listed following the discovery of a single population at the Dana Point Headlands in 1993. Upon expiration of the emergency rule, the species was federally listed as endangered under the Endangered Species Act on September 26, 1994 (59 *Federal Register* 5306). In addition, the Pacific little pocket mouse is a California Department of Fish and Game species of special concern.

The Pacific little pocket mouse is one of nineteen recognized subspecies of the little pocket mouse (*Perognathus longimembris*), and the smallest member of the family Heteromyidae. The pocket mouse has buff to grayish upperparts and a white belly. This species of pocket mouse typically has 1 to 2 litters a year (Burt and Grossenheider 1976).

Current occupied habitat is estimated to be less than 400 total hectares (1,000 acres) (USFWS 1998b). Historically, Pacific little pocket mouse distribution was much more extensive. Five historic populations have been extirpated, and the remaining eight historic locations are threatened by habitat destruction or fragmentation. The Pacific little pocket mouse is endemic to the coast of Southern California. Populations are restricted to the coastal strip of Southern California from the vicinity of the U.S./Mexican border north to El Segundo, Los Angeles County. Pacific pocket mice occur on coastal fine-grain, sandy or gravelly substrates. They are known to inhabit coastal strand, coastal dune, river alluvium, and coastal sage scrub growing on marine terraces (Grinnell 1933; Meserve 1972; Erickson 1994). The species has not been reported more than 2.5 miles from the ocean (USFWS 1998b).

Pacific little pocket mice are at least partially fossorial and relatively sedentary. They may become torpid, and estivate or hibernate in response to adverse environmental conditions (USFWS 1998b). They are primarily granivorous, feeding on small seeds.

The Pacific little pocket mouse was reportedly seen at the San Dieguito Lagoon in a 1979 study; however, a lead investigator (Steve Montgomery) stated the account was likely based on misidentification of a juvenile San Diego pocket mouse. A second, more recent report of a specimen just outside the study area cannot be confirmed. Subsequent trapping efforts in the area revealed no evidence of Pacific pocket mouse presence (SJM Biological Consultants 1994).

California Brown Pelican

The California brown pelican (*Pelecanus occidentalis californicus*) was listed as an endangered species under the federal Endangered Species Act in 1970. This listing was mainly due to decreased population numbers resulting from extensive DDT effects in the late 1960s and 1970s. This species is currently under consideration for de-listing due to the substantial recovery of populations and the achievement of recovery goals.

The California brown pelican is one of the six recognized subspecies of brown pelican occurring in tropical and subtropical waters of the Atlantic and Pacific oceans. The species is a large bird weighing up to 8 pounds with a wing span of up to 7 feet (Pereksta 1995). The adult bird has a grayish/brown body, and yellow/white head and neck. The sexes are similar, but adult males tend to be larger and have longer bills. The red gular pouch found on adults during courtship is only common in west coast birds.

Four discrete, breeding populations of the California brown pelican occur along the Pacific coast of North America (Pereksta 1995). The breeding range extends from the Channel Islands located off the California coast to Nayarit and Acapulco, Mexico. The non-breeding range can extend from Vancouver, British Columbia south to El Salvador. Approximately 90-95 percent of California brown pelicans breed on islands off the coast of mainland Mexico.

California brown pelicans are colonial nesters and require nesting grounds that receive limited disturbance, are free from mammalian predators, and close to foraging sites. Nest sites for the northernmost populations are generally located on steep, rocky slopes. Large, bulky stick nests are built on the ground or in low brush. The southernmost population on the Mexican mainland may nest in mangrove trees; while the Gulf of California and Baja California populations are generally found on arid islands using comparatively smaller nests in areas with less nesting material.

Roosting sites for wintering brown pelicans on the California coast are defined as “any substrate used to rest, maintain external body condition, find protection from adverse environmental factors, and interact with other conspecifics” (i.e., while not flying or swimming) (Jaques and Anderson 1987). Brown pelicans congregate at night roosts and spend considerable portions of most days on land. Day roosts may act as centers to facilitate the finding of food and attracting other groups of birds. Successful roosts are typically away from areas of direct human intrusion. Night roosts are generally characterized as being surrounded by water on all sides, with good protection from waves, tide, and wind.

In a competition for space on crowded roosts at offshore rocks, juveniles are often concentrated in more exposed areas while adults occupy the more protected locations.

Adult brown pelicans are efficient predators that spend considerable time loafing and roosting rather than hunting (Pereksta 1995). The birds are opportunistic and may shift day roosts in response to the distribution of fish food. Food resources utilized by the California brown pelican now seem to hinge disproportionately on the northern anchovy (*Engraulis mordax)* (Anderson et al. 1980). From 1972-1979, anchovies were found to comprise approximately 92.4 percent of a local pelican diet that included 2,195 fish items (Gress and Anderson 1983).

At San Dieguito Lagoon, the brown pelican was reported to be common in the summer and fall, but uncommon in the winter and spring (Josselyn 1997). However, focused avian surveys at the lagoon (MEC 1993) found this species in low numbers, and nearly all recorded observations were in the ocean environment, just west of the lagoon enhancement area. This species does not breed in the vicinity of the study area.

California Least Tern

The California least tern (*Sterna antillarum browni)* is listed as an endangered species by the federal government and the State of California. The status of least tern colonies and populations has been monitored in California since the late 1960s, with systematic monitoring since 1978 (Fancher 1992). Populations have generally experienced an increase in numbers over time coincident with predator management efforts at nesting colonies. The lowest numbers for this species were recorded in 1978, at 832 breeding pairs (Fancher 1992). Substantial population increases have been observed in the 1990s, and the 1998 status of the species is reported to be approximately 4,009 pairs at 40 colonies (Keane 1998). The 1980 recovery goal of 1,200 pairs at 20 secure coastal ecosystems (California Least Tern Recovery Plan, USFWS 1980) is presently undergoing revision.

The California least tern is a migratory bird that winters in Central and South America, and summers in northern Baja California and the central and southern coast of California. This species typically arrives in California to breed in early April and remains through mid-September. Sandy beaches and constructed dredge spoil areas close to lagoons, estuaries, and coastal embayments serve as nesting sites for the least tern. There are over 40 colony sites ranging from San Francisco Bay to Southern California and Mexico. Relatively successful nesting sites include Venice Beach, Terminal Island, Bolsa Chica Ecological Reserve, Huntington Beach, Santa Margarita River Estuary, Batiquitos Lagoon, Mission Bay, San Diego Bay, and Tijuana Estuary.

Least terns exhibit a high degree of nest fidelity from year to year (Atwood and Massey 1988). Mortality is highest for eggs and young at the colony, and substantially decreases for fledglings. Site fidelity appears to be most effected by reproductive failure associated with human disturbance, predation, and vegetative encroachment on the nest site. Reproductive success is also closely dependent on the availability of nearby food resources. Foraging activity is generally conducted within two miles of the colony (Atwood and Minsky 1983).

Least terns feed exclusively on small fishes captured in shallow nearshore waters, particularly at or near estuaries and river mouths (Massey 1974; Collins et al. 1979; Atwood and Minsky 1983; Atwood and Kelly 1984; Minsky 1984; Bailey 1984). Most prey species have a general size range of less than 9 cm in length and a body depth of less than 1.5 cm (Atwood and Kelly 1984). The size of the prey items taken is limited by both the gape of the tern and its ability to swallow various sized fish at different stages of tern growth. The unsuitability of certain spiny fish species and the width of a fish body also determine prey choice.

The nest is a simple scrape or depression in the sand, and two to three buff, speckled eggs are incubated for an average period of 21 days. Fledging generally occurs 20 days after hatching. Parents will continue to feed juveniles late in the season because they do not become proficient at capturing prey until close to the time of migration.

Predation at colony sites is recognized as the primary cause of individual losses. Predators include raptorial birds, opportunistic avian and mammalian predators of chicks and eggs, and to a lesser degree, reptiles and colonial insects such as ants. Managed colonies have curbed some of the predation problems facing least terns; however, predation is still the greatest threat to the species. In addition to predation, other factors may also influence the success of a tern nesting colony. Weather disturbances to incubating and brooding adults may subject eggs and chicks to blowing sand, extremes in temperature, and leave the eggs/chicks more susceptible to predation events. Increased human presence may also attract opportunistic predators (gulls, ravens, etc.) to the vicinity of a nesting colony, and render some nesting sites unsuitable. Newly constructed buildings, bridges, signs, and construction equipment may provide hunting perches for predatory bird species, potentially increasing predation at a nesting colony. Finally, while in-water construction is a less obvious threat to least tern breeding success, an increase in turbidity may impair the tern's ability to capture fish, and thus cause the tern to seek out more distant foraging areas. Greater travel distance to foraging sites would result in a longer reunion time for adults returning to feed their young. Where predation pressures are significant, this increased reunion time may be critical to the success of a colony.

Copper's foraging ecology study for San Diego Bay (1985) showed terns regularly forage up to 2.3 miles from their nesting colonies in the bay. Massey and Atwood (1980) saw many birds foraging 4 miles from a colony; however, they suspected birds found farther than 2.5 miles to be nonbreeders. Collins et al. (1979) observed some feeding flights 1-2 miles out to sea. Hay (1978) noted that California least tern colony sizes varied greatly regardless of distance to primary foraging areas. He stated that principal foraging areas appeared to be determined by the time in the breeding cycle, age class, and prey availability. Adults will go farther and spend more time getting large fish for themselves but shift foraging strategy to get more but smaller fish for small chicks (Atwood and Minsky 1983).

California least terns have been observed foraging along the open water of the San Dieguito River and restored embayment; however, breeding and nesting activity has not been observed in recent years . A 1992 breeding season study conducted by MEC (1993) indicated a maximum of 106 observations of least tern foraging within San Dieguito Lagoon. Observations of least tern use varied significantly according to habitat type, with the greatest number of observations at a saline pond (106) and the least at saltmarsh pond (1-2 observations) (MEC 1993).

In 1996, approximately 5 acres of nesting habitat was created by CDFG within San Dieguito Lagoon, however, no nesting has occurred at this site, which has become overgrown with weeds and is now unsuitable for nesting by terns (MEC 1993 The closest California least tern breeding colony is located at Batiquitos Lagoon approximately 9 miles to the north, where there are five artificially constructed nesting areas. .

California least terns have a very poor nest establishment record at San Dieguito Lagoon, and an even worse nest success (number of fledglings produced) record. The most recent nesting attempts at San Dieguito Lagoon were in 1992, when seven pairs reportedly attempted nesting on the flotsam line at the east end of the lagoon (personal communication, Dillingham CDFG 1998) but no fledglings were produced. Prior to 1992, there were 4 to 5 pairs reported in 1980 but only one fledgling was produced, and in 1979 one pair produced no fledglings.). No breeding has been reported in any part of the lagoon within the past 10 years (Patton, pers. comm., Dillingham, pers. comm.).The limited extent and poor quality of nesting habitat appears to be a key factor in the lack of breeding success of this species at San Dieguito (personal communication, Fancher, USFWS 1999).

Light-Footed Clapper Rail

The light-footed clapper rail (*Rallus longirostris levipes*) is one of three subspecies of clapper rail (*Rallus longirostris*) found in California. All three clapper rail subspecies are both state and federally listed as endangered under CESA and the federal ESA. Light-footed clapper rails are dependent on the coastal marshes of Southern California and northern Baja California Mexico, where they are year-round residents. Although salt marsh vegetation, typically with a preponderance of cordgrass, appears to be the rail's primary habitat, freshwater and brackish water marshes dominated by pickleweed (*Salicornia* spp.), bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) may also be used. These alternate habitats, when occupied, are typically located in proximity to salt marshes or are a relatively short-distance upstream from an estuary.

Marsh habitat appears to be essential for both nesting and foraging. Food items include fish, clams, crabs, snails, insects, and other invertebrates (Steinhart 1990). The nest is typically made out of dried cordgrass, which is woven into surrounding live, standing cordgrass. Without freshwater input, surrounding cordgrass will be stunted resulting in a conspicuous nest that is vulnerable to predators, particularly at high tide (Steinhart 1990). Clapper rail nesting occurs from mid-March to July with most egg laying occurring from early April to early May.

The light-footed clapper rail ranges from Carpinteria Marsh in Santa Barbara County south to San Quintín, Baja California, Mexico. In 1998, 17 sites were found to support at least one pair of light-footed clapper rails. Yearly censuring for light-footed clapper rails has been performed since 1980. In recent years, a high number of 325 breeding pairs were recorded in 1996, with 307 documented in 1997 (Zembal et al. 1996, Zembal 1998). However, a precipitous decline occurred in 1998 as only 222 pairs (a 28 percent decline) were detected at a total of 17 occupied sites. This decline may be due to extreme weather conditions associated with an El Niño storm season. Perhaps of greatest importance is that of the 222 pair recorded in 1998, 189 (85 percent) of these occur at only three sites (Upper Newport Bay, Tijuana Marsh NWR, and Seal Beach NWR) (Zembal 1998). Only three of the remaining 14 sites support more than four pairs. Clearly this species is in extreme danger of extirpation at the majority of sites where it is known to occur.

The decline of the light-footed clapper rail is believed to be directly related to the degradation and destruction of salt marsh habitat. It has been estimated that only about 8,500 acres of salt marsh remain between Santa Barbara and the U.S.-Mexico border (USFWS 1985). The remaining, often fragmented habitat leaves the rail vulnerable to predation by both native and non-native species. At Seal Beach National Wildlife Refuge, the population declined from 30 to 6 pairs in just six years, and was attributed to predation by the non-native red fox (*Vulpes vulpes*), which had become established at the site. Other threats to this species include feral cats and raccoons (Zembal et al. 1996).

Although the light-footed clapper rail has been irregularly reported at San Dieguito Lagoon over the past 10 years, it was not detected during any annual census conducted between 1998 and 1999 (Zembal 1998; personal communication, Jack Fancher 2000). Recently, a number of breeding pairs have been detected upstream of the restoration project near the El Camino Bridge in brackish water habitat (Norby, pers. comm., 2004). However, none have been observed within the restoration project footprint. The preferred nesting habitat of the species, low marsh dominated by cordgrass, is represented at San Dieguito Lagoon only at a very small site, where it was reintroduced. Measurements of the canopy height and stem density indicate that the existing stands of cordgrass in San Dieguito Lagoon do not meet the canopy architecture normally associated with successful clapper rail breeding habitat.

Western Snowy Plover

The Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*) was listed as a federally threatened species on March 5, 1993 (58 *Federal Register* 12874). Poor reproductive success (largely due to human disturbance), inclement weather, loss of nesting habitat, and encroachment of the introduced beachgrass (*Ammophila arenaria*) led to the decline in both the breeding and wintering populations of this species (USFWS 1993). Continued threats to species survival and recovery include human disturbance, predation, and overall loss of nesting habitat. Human disturbance appears to have the most detrimental effect on plover reproductive success, however, raptorial birds, corvids, and several mammal species have been documented preying upon plover nests or chicks. The greatest losses of western snowy plover habitat have occurred in Southern California.

The current breeding range of the western snowy plover extends along coastal beaches from southern Washington to southern Baja California, Mexico. Breeding is also reported from the California Channel Islands. Prior to 1970, snowy plovers bred at 53 coastal California locations. Presently, breeding occurs at only approximately 20 mainland locations. The breeding population in California declined sharply from an estimated 1,565 adults in 1980 to 1,386 in 1989. This decline included a 55 percent decline in north San Diego County and a 41 percent decline in San Diego Bay (USFWS 1993).

Snowy plovers breed in loose colonies. Sand spits, dune backed beaches, sparsely to unvegetated beach strands, open areas around estuaries, and beaches at river mouths are preferred nesting areas. Nest sites are typically flat, open areas with sandy substrates and little to no vegetation. Snowy plovers have been shown to display breeding site fidelity. The breeding season extends from March 1 through September 15. Egg laying typically begins in mid-March. Three eggs are commonly laid in a shallow depression nest. Incubation lasts approximately 27 days. Chicks are precocial and leave the nest almost immediately, but do not gain the ability to fly for about 31 days. Males attend their young for approximately 29-47 days (Warriner et al. 1986). Snowy plovers forage on invertebrates.

Eleven monthly surveys conducted from April 1992 through April 1993 recorded a total of 50 observations of western snowy plovers at San Dieguito Lagoon (MEC 1993). The mean number of birds per survey was about five, with a high count of 36 in December (wintering individuals). An influx of "overwintering" birds is a typical phenomenon for Southern California beaches. The majority of birds were found in beach and/or estuarine flat habitats, which were located either southwest of the Del Mar Fairgrounds or approximately 450 meters south of the river mouth.

Extant undisturbed nesting habitat on the site is limited, a likely factor in the species' lack of breeding success at San Dieguito. In 1992, a single pair of snowy plovers was found nesting around the margin of the saline pond in San Dieguito Lagoon. The nest was located approximately 450 meters south of the river mouth (MEC 1993). In 1998, 156 snowy plover nests were observed at nine sites in San Diego County. The closest nesting site to San Dieguito is Batiquitos Lagoon, where five nesting areas have been constructed. In 1998, these created nesting areas supported 17 percent of the nests observed in the County (Powell et al. 1998).

In 1999, the Fish and Wildlife Service did not list San Dieguito Lagoon as critical habitat for the Western Snowy Plover. However, the Western Snowy Plover (West Coast Population) Draft Recovery Plan (May 2001) lists the San Dieguito area as one of many areas along the California, Oregon and Washington coasts that could be managed to promote the recovery of the species.

Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) was federally listed as an endangered species on March 29, 1995 (USFWS, 1995). This species occurs in dense riparian habitat normally vegetated with willows (*Salix* spp.) with a scattered overstory of cottonwood (*Populus* sp.), but is also found in stands of tamarisk (*Tamarix* spp.) or arrowweed (*Pluchea sericea*). The breeding range of this subspecies of willow flycatcher includes southern California, southern Nevada, southern Utah, Arizona, New Mexico and western Texas. The cause of this species' decline is due partially to the extensive loss of suitable riparian habitat and brood parasitism by brown-headed cowbirds.

Due to the lack of dense willow riparian habitat in the project area, this species is not expected to breed within the project boundaries. During the fall and spring migrations, Southwestern willow flycatchers may be expected as infrequent visitors to the area in any of the trees or large shrubs onsite. On August 21, 1997, the USFWS included the San Dieguito River between Lake Hodges and Interstate-5 as part of the southwestern willow flycatcher's critical habitat including those areas where riparian habitat does not currently exist but may become established naturally or by habitat restoration (USFWS 1997).

California Gnatcatcher

The California gnatcatcher (*Polioptila californica*) is a member of the Black-tailed Gnatcatcher group, which occupies arid scrublands of the southwestern United States, including Southern California, north-central and western Mexico, and Baja California, Mexico (Atwood 1988). The California gnatcatcher occurs along coastal Southern California and into Baja California, Mexico. The coastal California gnatcatcher (*Polioptila californica californica*) is the only subspecies of the California gnatcatcher that occurs within the United States. It is presently found primarily in San Diego, Orange, and western Riverside counties, having been largely extirpated from Ventura, San Bernardino, and Los Angeles counties. Habitat loss and fragmentation are the two most probable causes of this species' decline, though other factors such as brood parasitism by brown-headed cowbirds (*Molothrus ater*), and predation by domestic pets may also be factors in some areas.

Two petitions were submitted to the USFWS on September 21, 1990 to list the coastal California gnatcatcher as a federally endangered species. A third petition was submitted on December 17, 1990 by the Natural Resources Defense Council requesting emergency listing of the species. A Final Rule was made on March 25, 1993 when the species was listed as a federally threatened species. The California gnatcatcher is listed as a Species of Special Concern by the California Department of Fish and Game.

California gnatcatchers are most typically found as year-round residents of coastal sage scrub habitats. Open areas of chaparral (e.g., chamise-dominated) and other open scrubland habitat may also be occupied by gnatcatchers. Typical plants of gnatcatcher-occupied habitat include California sagebrush, flat-top buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*), San Diego County viguiera (*Viguiera laciniata*), coast cholla (*Opuntia prolifera*), and common chamise (*Adenostoma fasciculatum*). Relatively taller shrubs such as laurel sumac (*Malosma laurina*) and/or lemonadeberry (*Rhus integrifolia*) are also often present.

In San Diego County, California gnatcatchers occur from near sea level up to approximately 1,000 feet elevation. However, in Riverside County, California gnatcatchers were observed in habitat up to 2,400 feet, but were more typically found in relatively lower elevations (below 1,800 feet) (PSBS 1994).

Most nesting occurs between March and July. A small, cup nest is typically built from 2-3 feet off the ground in a low-to-moderate sized shrub. Nest building occurs over a 4-10 day period, after which 2-5 eggs may be laid. Both sexes incubate the eggs, which hatch in approximately 14 days. Nestlings fledge in approximately 16 days, and thereafter remain in association with the adults for 3 weeks. Early season fledglings may be driven away by the parents, which may then re-nest. Late season fledglings may remain with the adults for extended periods (Atwood 1990). Nest failures are common, and may be due to predation, nest parasitism, or other factors.

Documented home ranges of California gnatcatchers are variable, but tend to be from approximately 7 to 25 acres in size (PSBS 1989; ERCE 1989, 1990a, 1990b; Bontrager 1991). Home ranges tend to be smaller in coastal areas as compared to inland localities. Home ranges may be considerably smaller in the breeding season, and as drying conditions develop in drought deciduous habitats. Home ranges may expand and/or shift to include riparian fringe and/or dense non-deciduous shrub vegetation (PSBS 1989).

On the San Dieguito project site, suitable habitat for the California gnatcatcher is extremely limited and consists of a modest number of big saltbush and several scattered coyote brush located just west of I-5. No resident California gnatcatchers were identified during focused surveys for this species in 1998 (Merkel & Associates 1998). Three pairs of gnatcatchers are known to occur in far more suitable habitat off-site to the immediate south, west of I-5 and south of the residential access road (personal observation, R. Woodfield, Merkel & Associates, Inc. 1998). California gnatcatchers have also been observed on the naturally vegetated north facing slopes located east of I-5 and below the Carmel Valley community (personal communication, V. Touchstone, San Dieguito River Park JPA 1999). Although much of the native upland vegetation in this region of coastal San Diego County has been lost to urban or agricultural development, California gnatcatchers continue to be common residents wherever even small patches (approximately 5 acres or greater) of sage scrub remain (personal observations, D. Mayer and C. Reiser, Merkel & Associates 1991-1998). Three individuals were observed moving through the property during one of the gnatcatcher surveys (Merkel & Associates 1998). Based on the behavior of these birds and the absence of sightings on follow-up visits, these gnatcatchers were judged to be dispersing juveniles.

Least Bell's Vireo

The least Bell's vireo (*Vireo bellii pusillus*) was listed as an endangered species under the State Endangered Species Act on October 2, 1980 (CDFG 1998) and under the Federal Endangered Species Act on May 2, 1986 (USSFWS 1986). The listing was primarily attributed to the synergistic effects of habitat loss and brood parasitism by the brown-headed cowbird (*Molothrus ater*). At the time of federal listing, the least Bell's vireo population was estimated at 300 pairs. Current population estimates are not available, but 1996 census data indicated a population increase to 1,346 pairs (USFWS, unpublished data).

Historically the least Bell's vireo was widespread and abundant from interior northern California, south through the Sacramento-San Joaquin Valleys and Sierra Nevada foothills, and in the coast ranges from Santa Clara south to approximately San Fernando, Baja California, Mexico. Populations were also found in Owens Valley, Death Valley and throughout the Mojave Desert (USFWS 1998a). Currently the least Bell's vireo breeding distribution is restricted to eight Southern California counties and portions of Baja California, Mexico.

The least Bell's vireo is an obligate riparian species during the breeding season, typically inhabiting structurally diverse woodlands along watercourses. Breeding habitat may include cottonwood-willow forests, oak woodlands and mule fat scrub. Less is known about the wintering habitat of this species; however, they do not appear to be dependent on riparian woodland. Vireos are known to winter in mesquite scrub vegetation in arroyos, but they may use palm groves and agricultural or residential hedgerows (USFWS 1998a).

Least Bell's vireos typically arrive on their Southern California breeding grounds between mid-March and early April. Males arrive in advance of females, and returning adult breeders may arrive before hatch-year birds (USFWS 1998a). The vireos generally remain on the breeding grounds through August or September. Males establish and defend territories from 0.5 to 0.75 acres in size (USFWS 1998a). Nesting chronology is well documented for this vireo. Nest building commences a few days after pair formation, and generally lasts four to five days. Egg laying begins 1-2 days after nest completion and the eggs (typically 3-4) are incubated for 14 days. Nestlings are tended until fledging at 10-12 days, after which adults feed the fledglings for at least two weeks (USFWS 1998a). Although multiple nesting attempts per season are not uncommon, most pairs fledge young from only one to two nests.

Predation is a major cause of nest failure, particularly in areas of little brood parasitism. Predators include western scrub jays (*Aphelocoma californica*), Cooper's hawks (*Accipiter cooperii*), gopher snakes, mammalian predators, and ants. Human disturbance may also be a source of nest disturbance and ultimate failure.

Least Bell's vireos are insectivorous, primarily utilizing foliage gleaning and hovering foraging techniques. Their diet consists of a variety of insects, most often captured within vegetation three to six meters in height (USFWS 1998a).

At San Dieguito Lagoon, riparian habitat is extremely limited and is mostly found upstream of the project site. Late 1998 breeding season observations indicated the presence of a solitary, singing male (Merkel & Associates 1998). Breeding records from this site are not known.

Belding's Savannah Sparrow

The Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) was listed as state endangered under the California Endangered Species Act on January 10, 1974. Development along the Southern California coast has eliminated much of this species habitat. Many of the high tidal marsh areas utilized by this species for nesting have been diked or filled for houses, roads, and other uses. In 1986, only approximately 2,274 pairs of Belding's savannah sparrows were found in 27 California marsh areas (Steinhart 1990). Two-thirds of the marshes inhabited by the Belding's savannah sparrow are privately owned. However, approximately 45 percent of the individuals are located on U.S. Navy lands and in the Tijuana Estuary National Wildlife Refuge (Steinhart 1990).

Belding's savannah sparrows are year-round residents of the coastal salt marsh from Santa Barbara County south into Baja California, Mexico. This species nests in pickleweed (*Salicornia virginica*), just above the high tide line. Nesting has also been observed in salt grass (*Distichlis spicata*). Breeding season ranges from February through September, but nesting usually occurs from mid-March through early July. Individuals engage in chasing and vocalizing, and males defend small territories. A concealed cup nest is constructed usually with its rim flush to the ground. Three to five eggs are incubated for approximately 12-13 days. Young fledge from the nest at between seven and ten days, after which, both adults tend to the fledglings (Ehrlich et al. 1988). Pairs may reclutch.

Belding's savannah sparrows feed on sand flies and insects found on mudflats, beaches and coastal vegetation. Wintering habitat may include upland habitats.

Belding's savannah sparrows have been consistently observed at San Dieguito Lagoon. Pairs were observed in association with the salt marsh during the breeding season. Large flocks congregate in the salt marsh, as well as forage in upland areas outside of the breeding season. Surveys conducted from April 1992 through April 1993 recorded a total of 884 Belding's savannah sparrows at San Dieguito Lagoon. These results were comparable to those of 1986 surveys, suggesting a stable population (MEC 1993).

Belding's savannah sparrow habitat in the San Dieguito River area consists mainly of salt marsh in the intertidal zones where *Salicornia virginica* is prevalent. Slightly higher elevations are often dominated by *Salicornia subterminalis* or vegetated with non-native weedy species such as mustard and grasses. The primary savannah sparrow habitat therefore occurs immediately adjacent to the shoreline. The density of sparrows declines with distance away from the shoreline. At distances of 3-5 meters from the shoreline in some places, to 10 or so meters in others, savannah sparrows become scarce or absent.

During the SAIC June-July 1998 surveys for this species, savannah sparrows were observed on the eastern side of the I-5 around the brackish lagoon, on the CDFG preserve property, in the saltmarsh habitat at the river mouth and along the San Dieguito River. They were also occasionally found in ruderal areas adjacent to their preferred habitat. A tendency was found for savannah sparrows to be less common where the habitat was less extensive (such as where only a narrow strip of habitat occurs along a shoreline). Where the habitat extended over a wider area, sparrow densities were higher per unit area of habitat. The SAIC surveys resulted in 107 savannah sparrow observations within the project area. Seventy-five of those savannah sparrows were observed on the CDFG property. Birds were observed in pairs or more frequently as groups of four to five individuals presumed to represent family units.

2.5.10 Sensitive Habitats

The City of San Diego and the CDFG consider the following habitats present within the project boundaries as biologically sensitive habitats: open water, salt marsh, seasonal marsh, fresh and brackish water marsh, riparian woodland and scrub. This designation is related to species richness, importance to wildlife and sensitivity to development (City of San Diego 1994). Wetlands are also considered sensitive by federal and state resource agencies as well as local conservation organizations. Southern coastal foredunes habitat represented onsite by one small area near the river mouth is classified as sensitive, based on rarity and ecological value, according to the guidelines in the Land Development/Zoning Code Update (City of San Diego 1997).

Wildlife Corridors

Wildlife corridors are considered biologically significant by the City of San Diego (1994), which defines wildlife corridors as:

“. . . areas of land where development would sever a connection between two habitats. Connections need not be wide; narrow corridors can be used by many plant and animal species. The area with habitat value to which the site is connected must be at least 10 acres in size.”

Jurisdictional Wetlands

Under Section 404 of the Clean Water Act, wetlands and other “Waters of the United States” cannot be dredged or filled without a permit from the U.S. Army Corps of Engineers (USACE). Non-wetland areas protected as Waters of the U.S. are generally defined as the limits of ordinary high water, whereas USACE and USEPA regulations recognize wetlands as a Special Aquatic Site based on three criteria: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology, as defined in the 1987 USACE Wetland Delineation Manual. Section 404(b)(1) requires that the placement of fill in defined wetlands be avoided unless there is no practicable alternative. The City of San Diego Resource Protection Ordinance considers an area a wetland if it meets any one of the three criteria: wetland vegetation, soils or hydrology. The California Coastal Commission and the CDFG use a similar one-criterion approach.

A determination of the Corps of Engineers jurisdiction under Section 10 of the Rivers and Harbors Act and under Section 404 of the Clean Water Act was completed and submitted to the Corps in April 2004. The ~~jurisdictional map is currently under review by the Corps; however, the probable~~ Section 404 jurisdictional wetlands and other Waters of the U.S. are shown in Figure 2.21.

Within the San Dieguito wetland restoration area, in lieu of a detailed delineation of Coastal Commission jurisdicitional wetlands, the conservative assumption has been made that all areas of tidal and non-tidal open water, tidal and non-tidal flats, marsh (freshwater, brackish, seasonal, and salt marshes included), and transitional habitats constitute probable State wetlands. The delineation of these areas is largely based on one parameter—either inundation by shallow water or the presence of hydrophytic vegetation, these areas meet the State wetland definition. In July 2004, an update of the Coastal Commission wetland areas was completed for those areas beneath berms and nesting sites. ~~The Commission staff are currently verifying this determination.~~

~~Elsewhere within the project area, the USACE has delineated jurisdictional wetlands on the 22nd District Agricultural Association's Surf and Turf property and East Parking Lot. More recent delineations of these areas (BRG 1996a, 1996b) have not yet been accepted, and so the Corps' original (1993) delineation of these areas is reflected in Figure 2.21.~~

A recent consultant's delineation of the trail corridor area (Tierra 1999, revised 2005) suggests that ~~much or all~~ portions of the trail where it is placed along an existing graded and/or gravel road across the restoration area north of the river and east of I-5 ~~could be~~are jurisdictional. ~~Pending further review of this area by the USACE and the Commission, t~~The area of potential jurisdictional wetland as mapped in Figure 2.21 is limited to areas of the trail alignment where wetland habitat characteristics are clearly represented within or immediately adjacent to the existing road. Elsewhere within the project area, the USACE has delineated jurisdictional wetlands on the 22nd District Agricultural Association's Surf and Turf property and East Parking Lot. The Corps' original (1993) delineation of these areas is reflected in Figure 2.21. The state jurisdictional area (Tierra 1999, revised 2005) is also reflected on the 22nd District Agricultural Association's Surf and Turf property in Figure 2.21.

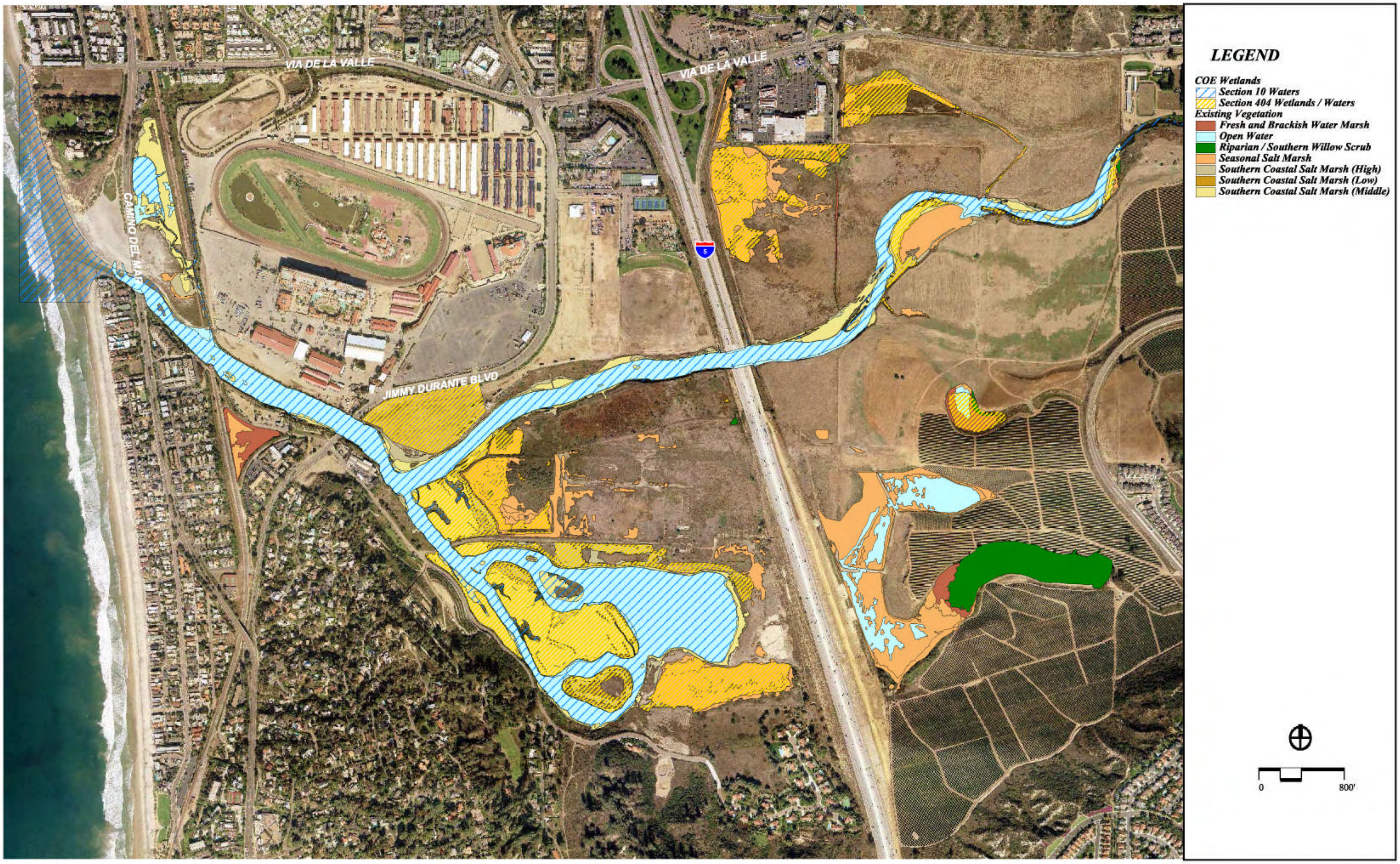


Figure 2.21. Probable Section 404 Wetlands and Other Waters of the United States

Multiple Species Conservation Program

The Multiple Species Conservation Program (MSCP) is a regional conservation program that identifies conservation lands that provide habitat for multiple species including federally and state listed threatened or endangered species. Species identified in the MSCP would be considered adequately preserved as long as lands proposed for open space and habitat preservation within a Multi-Habitat Planning Area (MHPA) are conserved, including designated biological core areas, linkages, and potential preserve areas. Core areas are those that support a high concentration of sensitive biological resources, which if lost or fragmented, could not be replaced or mitigated elsewhere. Linkages are essential connections enabling wildlife movement between Biological Core Areas. The proposed project lies within the northern portion of the City of San Diego Subarea Plan and the project site include a Biological Core Area and a 90 percent Habitat Preserve Area. In addition, several species within the project area that are not listed by the resource agencies are considered "covered" by the MSCP. Species found within the project site that are included in the MSCP list of covered species include California brown pelican, American peregrine falcon, light-footed clapper rail, Western snowy plover, California least tern, southwestern willow flycatcher, coastal California gnatcatcher, least Bell's vireo, Belding's savannah sparrow, reddish egret, white-faced ibis, northern harrier, Cooper's hawk, long-billed curlew, western burrowing owl, cactus wren, Southern California rufous-crowned sparrow, large-billed savannah sparrow, tricolored blackbird, Canada goose, southwestern pond turtle, orangethroat whiptail, salt marsh skipper, salt marsh bird's beak, Nuttall's lotus and Del Mar sand aster. The southern mule deer and American badger are included in the MSCP list of covered species and may be present on the project site (City of San Diego 1997).

2.6 LAGOON HYDROLOGY AND HYDRAULICS

2.6.1 Hydrology

The San Dieguito River, including its major tributaries Guejito Creek, Santa Maria Creek, and Santa Ysabel Creek, drains an area of 345.5 square miles. The watershed extends from the higher elevations on Volcan Mountain (in the Laguna Mountains) near Julian to the Pacific Ocean and has a total approximate length of 48 miles (Figure 2.22). Dams control approximately 88 percent of the total drainage area. Lake Hodges, located approximately 10.5 miles upstream from the coast, traps virtually the entire bed material load (coarse sediment) from upstream sources, with only wash load (clays and silts) traveling through the reservoir during floods.

Prior to construction of the dams, the main source of sediment load for the San Dieguito River was derived from the highlands, as evidenced by the granular nature of the sand and gravel alluvial deposits of the valley areas. As most of the sediment load is now intercepted by Lake Hodges, the present sediment source area represents the 42-square mile coastal watershed downstream of Lake Hodges and the remaining alluvial deposits of the lower reaches of the river. A recent sand mining operation near the Via de Santa Fe Bridge excavated sand deposits from the river. Until the excavated area fills in, this site will

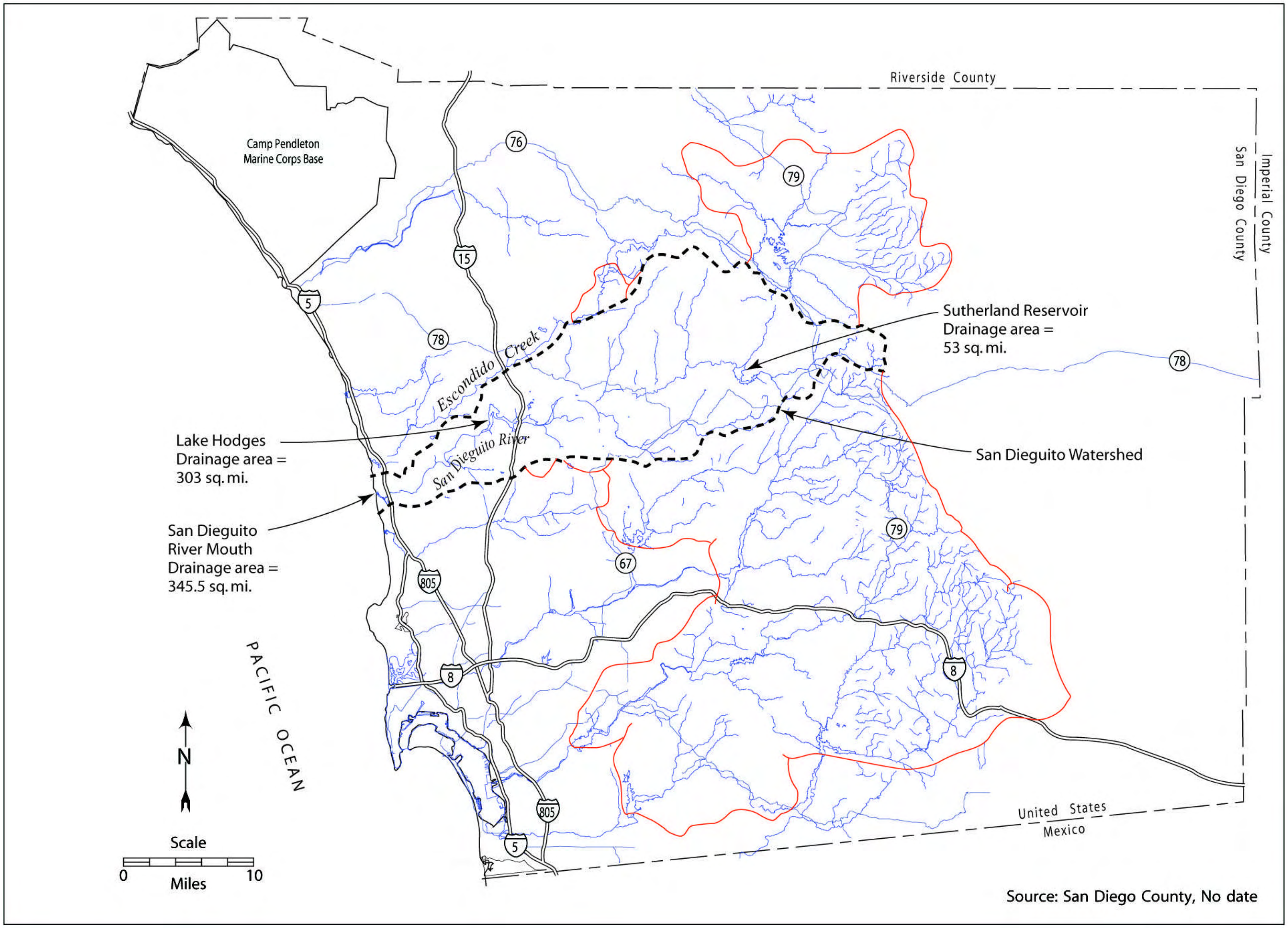


Figure 2.22. San Dieguito Watershed

represent an additional sediment sink, intercepting essentially the entire bedload arriving from upstream.

The lower reaches of the San Dieguito River have been incised into the broad coastal terrace, creating a 2,000 to 3,000-foot-wide, relatively level alluvial valley. The actual low-flow channel traversing the valley floor is typically only 200 to 300 feet wide. The river valley in the 5.5-mile reach between the ocean and the sand mining site at Rancho Santa Fe has been modified extensively by development, although the path of the low-flow river channel remains very similar to what it was in the 19th century. Important features in this reach include the following:

- A natural beach berm at about mile 0.03, which can (and usually does) close the river mouth to all tidal flow.
- The Railroad Bridge at mile 0.29.
- A long, narrow, nearly straight channel from the beach to about mile 0.60 (the inlet channel).
- The Camino Del Mar (Highway 101) Bridge at mile 0.09.
- The Jimmy Durante Boulevard Bridge at mile 0.57.
- A sharp turn between mile 0.67 and mile 0.75.
- A long, narrow, nearly straight channel from mile 0.75 to about mile 1.35 (the west channel).
- The I-5 Bridge at mile 1.38.
- A series of broad meanders between mile 1.50 and mile 2.62.
- A utility corridor (major crossing) at about mile 2.47.
- The El Camino Real Bridge at mile 2.81

2.6.2 Precipitation and Surface Runoff

Precipitation is the main source of water to the watershed. An understanding of this relationship provides a rational method of evaluating the intensity and duration of a particular design storm at any location within the San Dieguito watershed. Rainfall must be of sufficient intensity and duration to exceed the soil's moisture-absorbing capacity and travel downslope. The duration must also be long enough to allow the runoff at any location to travel overland until it reaches more defined drainage paths, the San Dieguito River, and ultimately, the coastline. Within the San Dieguito watershed, the travel time for precipitation falling in Julian to reach the coastline, neglecting the presence of upstream dams, is approximately 3 days. As a result, storm duration must exceed 3 days for runoff occurring near the easternmost areas to affect flooding associated with rainfall 3 days later along the coast (San Diego County 1985).

The San Diego vicinity has a mild subtropical climate. The moderating influence of the Pacific Ocean provides minor temperature differences between summer and winter. In San Diego's semi-arid climate, rainfall is strongly seasonal, with a short wet season in the winter and dry conditions during the summer. Winter storms usually occur from November through April, with the greatest frequency and intensity normally occurring from December through

March. Storms may last for several days and are usually accompanied by widespread precipitation in the form of rain, or occasionally snow in the higher elevations. The majority of Southern California's most serious floods resulted from the passage of winter storms.

Rainfall measured at Lindbergh Field, from the time records began to be kept in 1850 until the present, ranged from a high of approximately 26 inches in 1883-84 to a low of approximately 3.3 inches in 2002~~-2003~~ [Based on Water Year (October-September)] (Figure 2.23). The 30-year average (1941 to 1970) for the County indicates a range in average annual rainfall from 9 inches near the coast to approximately 32 inches near Cuyamaca State Park in the mountains to the east.

San Diego County operates approximately 90 stream flow stations, both recording and crest stage gauges, with seven stations within the San Dieguito watershed. This data is analyzed for each water year (October 1 through September 30), and peak flows, along with average daily and monthly flows, are reported. Annual flow volumes are also reported for all of the recording gauge stations. In addition, the Flood Control Group has installed and operates telemetered recording gauge stations to record unusual water level variations at six reservoirs throughout the County, including Lake Hodges.

2.6.3 Flooding

The U.S. Army Corps of Engineers (USACE) and the County of San Diego have performed hydraulic studies of the San Dieguito River and its tributaries to define the design flows (i.e., floods that occur on average once in a specified period) at various locations within the watershed. Design discharges for the lower San Dieguito River (Chang 1997) are listed in Table 2.13.

The existing low-flow river channel may contain up to a 2-year flood, whereas all other flood events can be expected to overflow the channel and spill out onto the valley floor. Intermediate flood flows, after breaching the low-flow channel, quickly spread out across the valley floor, causing significant area inundation. The El Niño-induced flooding in the early 1980s, on several occasions, flooded low-lying lands throughout the valley, including the residential area east of Camino Del Mar, just south of the river. Extensive flooding permeated much of the fairgrounds, including the parking lots both east and west of Jimmy Durante Boulevard; the alluvial floor of Crest Canyon to the south; the westerly, southerly, and easterly margins of the Via de la Valle shopping center just east of I-5; and a 2,000-foot width of low-lying lands extending from I-5 up to El Camino Real. Under existing conditions, the 100-year flood would essentially cover the entire valley floor, extending from near Via de la Valle on the north to the base of the southerly valley sidewalls.

The U.S. Flood Disaster Protection Act requires that the 100-year flood be considered in protecting cities from gradually rising floodwaters San Diego County uses the 100-yearflood model in preparing “flood-prone area maps,” which provide guidelines for development and floodplain management within the river environment (Figure 2.24). Table 2.14 provides the probability of the 100-year design flood occurring or being exceeded within a given project design life.

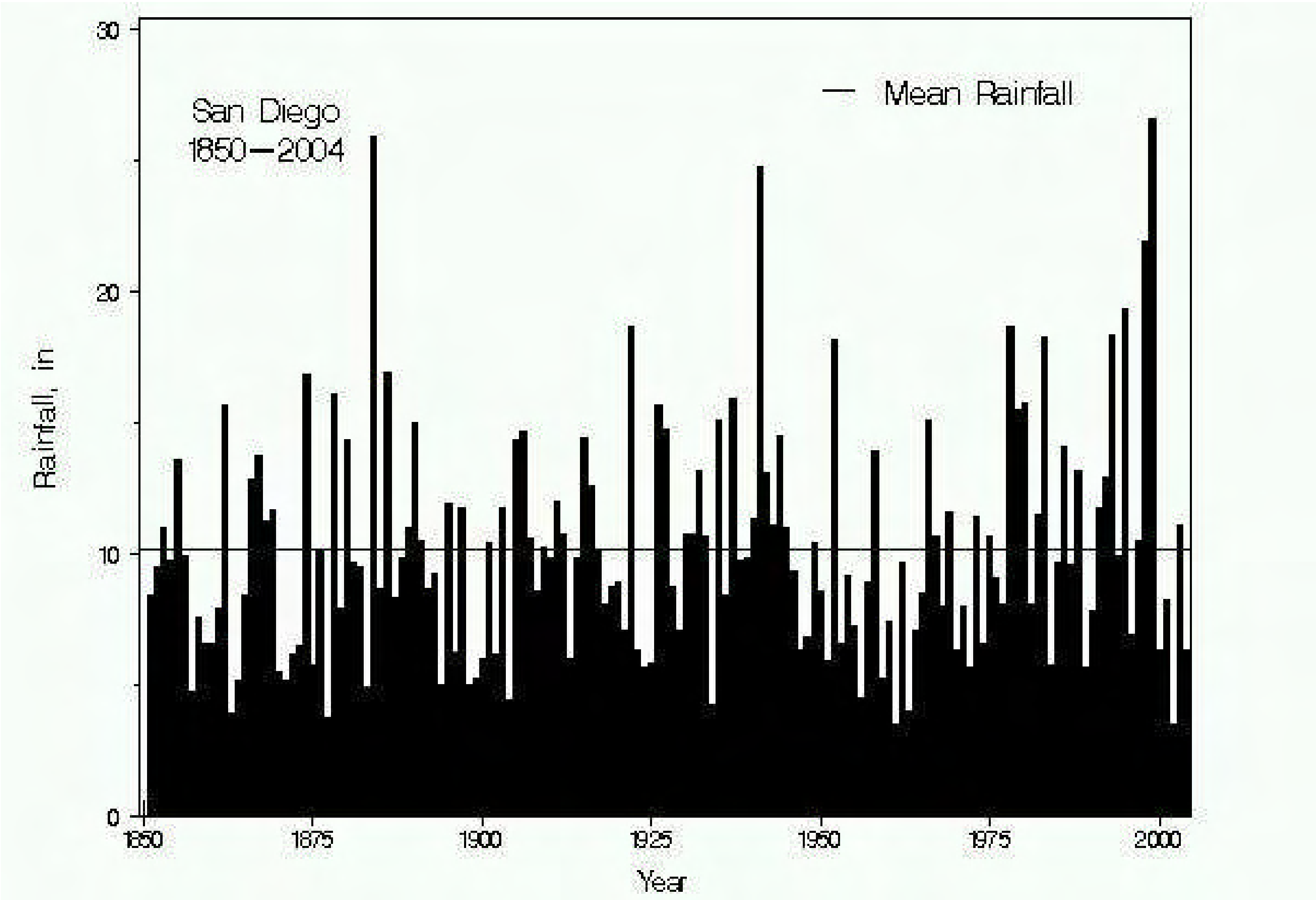


Figure 2.23. San Diego's Annual Rainfall History

Table 2.13. Design Discharges for Lower San Dieguito River

Flood Event	***Peak Discharge (cfs)***
10-Year	5,700
50-Year	31,400
100-Year	41,800

Source: Chang 1997

Table 2.14. Probability of 100-Year Design Flood

Project Design Life (years)	***Probability of at Least One Peak Flood Equal to or Exceeding the 100-Year Design Flood Flow during the Project Design Life***
100	63%
50	39%
25	22%
10	10%
1	1%

Source: Linsley & Franzini 1964

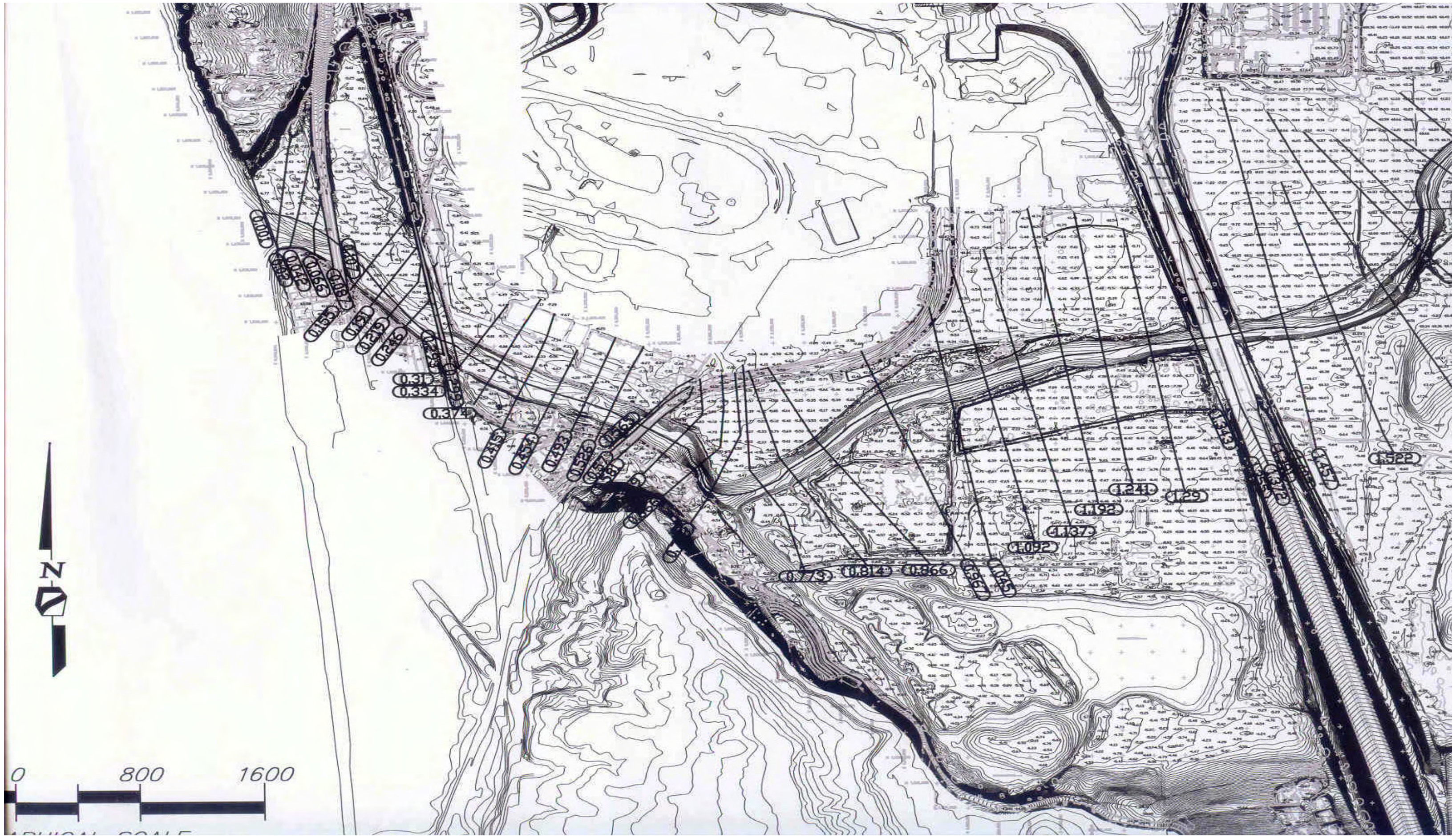


Figure 2.24. Lower San Dieguito River 100-Year Flood Inundation Unit

2.6.4 Water Surface Elevations

2.6.4.1 HEC-2

The National Flood Insurance Program, in developing Flood Hazard Boundary Maps (FHBM), uses the computer program HEC-2 to develop the maximum water surface elevation for defining the flood hazard boundary. This delineates areas subject to inundation by the base 100-year flood. The HEC-2 program, developed by the USACE Hydraulic Engineering Center (HEC), is a fixed-boundary model that requires digitizing a sufficient number of river cross-sections to characterize the existing river geometry. The computer The existing hydraulic environment within the lower San Dieguito River was modeled by SCE consultants utilizing river cross-sections considered representative of the downstream 2.8 miles of the river. The approximate locations of these river cross-sections are shown on Figure 2.25, with section numbers corresponding to river mile station extending upstream from the river mouth. The computed water surface elevations for the 100-year flood events, based on the HEC-2 computer modeling, are presented in Table 2.15. Graphical representations of both the water surface profile and channel bed elevation are shown on Figure 2.26 (Chang 1998b).

Floodplain mapping in San Diego County is complicated by the fact that streams in Southern California are typically ephemeral (i.e., they flow intermittently). Typically, the streams are also quite steep and have relatively high flow velocities that tend to erode the bed and banks of the river during flood flows. Conversely, deposition may occur during slower flows. Erosion and scour occur in alluvial valleys, sometimes damaging utilities and road crossings, and often encroaching on structures, roads, and properties adjacent to the floodway. Sediment deposition can also occur in other areas, increasing the river's conveyance to spreading floodwaters beyond the limits predicted by HEC-2.

The National Flood Insurance Program mandates the use of a rigid boundary model, such as HEC-2 or HEC-RAS, as the basic tool for floodplain mapping for federal insurance studies. The model assumes fixed stream boundaries; however, both FEMA and the USACE acknowledge that ephemeral streams, such as the San Dieguito River, generally do not have fixed boundaries. The HEC-2 or HEC-RAS program may have deficiencies when evaluating the flood inundation limits within ephemeral streams. Both FEMA and the USACE also realize that an erodible-boundary model, capable of including channel bed scour and fill (or aggradation and degradation), width variation and physical constraints, such as bank protection, grade control structures, and bedrock outcroppings, would more realistically model the fluvial processes typical of the ephemeral rivers in the arid Southwest.

The impact of floodplain encroachment (i.e., filling in land that used to flood) is an important consideration related to the location of the Del Mar Fairgrounds' property, the Horsepark, commercial and industrial development along Via de la Valle in the lower northern portion of the floodplain, and residential and other light commercial development along the lower southern margin of the floodplain. Floodplain encroachment constricts channel flow; thereby increasing water depths, flow velocities, and potential for channel bed scour. Although the fairgrounds and other floodplain encroachments are still subject to flooding because these properties are not elevated enough to completely remove them from the 100-year flood

Figure 2.25. Lower San Dieguito River Hydraulic Modeling Cross Sections

Table 2.15. Computed Water Surface Elevations for 100-Year Flood Based on Existing Conditions

Section River Mile	*Location*	COMPUTED WATER SURFACE ELEVATION (FEET, NGVD*)	
		HEC-2	*FLUVIAL-12*
0.00	River Mouth	7.6	0
0.087	Highway 101 Bridge	11.1	2.5
0.155		16.3	3.7
0.293	Railroad Bridge	16.7	6.7
0.374		16.8	7.6
0.454		16.8	8.7
0.570	Jimmy Durante Bridge	17.3	9.0
0.706		18.9	11.6
1.045		19.1	13.0
1.241		19.2	14.1
1.355	I-5 Bridge	19.3	14.7
1.522		19.8	15.7
1.979		20.2	16.9
2.311	East End of Levee	20.4	17.5
2.479		20.5	17.8
2.551		20.5	18.1
2.688		20.6	18.6
2.806	El Camino Real	20.7	20.3
2.813		20.9	20.6

*National Geodetic Vertical Datum of 1929 (NGVD)

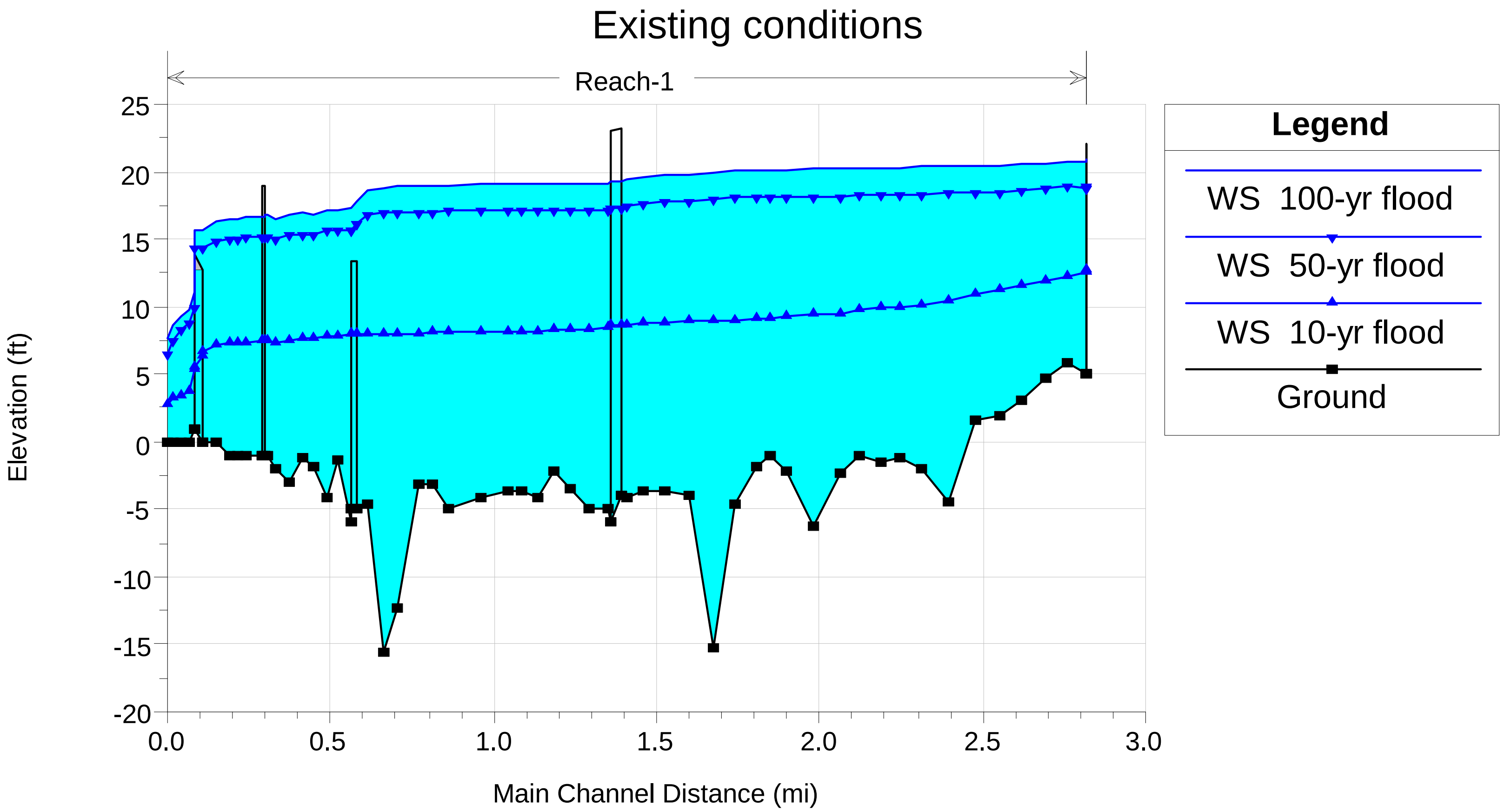


Figure 2.26. Computed Water Surface Profiles for the 10-, 50-, and 100-Year Floods

inundation limits, encroachment into the natural floodplain has a negative impact on the natural fluvial processes through this section of the river. As indicated in Figure 2.26, significant flooding affects most of the low-lying development downstream of El Camino Real, creating potential problems for many low-lying areas, both in terms of flood inundation and riverine scour.

Bridges typically provide a constriction in the flow area, thereby affecting water surface and bed elevations for some distance upstream and downstream, depending on the severity of the constriction. On the upstream side, there may be an increase in water-surface elevation for a given flow and possibly a consequent reduction in velocities and deposition of sediment. Conversely, flow velocities may accelerate through the constriction, causing streambed degradation at and immediately downstream of the constriction. Additionally, local scour may occur around bridge footings and abutments, which are controlled primarily by the dimension and shape of the structure (HEC 1977). Local scour in excess of 5 feet in depth, may negatively impact the stability of the structure and/or abutment.

Five bridges cross the San Dieguito River within the study area: Railroad Bridge at mile 0.293-0.299; Camino Del Mar (Highway 101) Bridge at mile 0.087-0.107; Jimmy Durante Boulevard Bridge at mile 0.570-0.581; I-5 Bridge at mile 1.355-1.391; and El Camino Real Bridge at mile 2.806-2.813. An additional bridge on Grand Avenue crosses one of the tributary channels within the lagoon south of the main course of the San Dieguito River. Both the Railroad and the Jimmy Durante Boulevard bridges and their associated abutments cause significant channel constrictions, and they are not capable of passing the 100-year design flood under the bridge soffit (the underside of the bridge) in their existing condition. The significant constriction associated with these bridge abutments would result in overtopping of the bridges and increased channel bed scour, threatening the stability of these structures. The Railroad Bridge, due to its wood trestle-type construction, also creates the potential for significant debris (trees, branches, etc.) loading during flood flows, which could in fact clog the entire channel conveyance up to the bridge deck and impact water surface profiles upstream of the bridge. Although the Railroad Bridge may become undermined and fail during a design storm, the debris load could temporarily create significant upstream flooding prior to bridge failure (Chang 1999b).

2.6.4.2 FLUVIAL-12

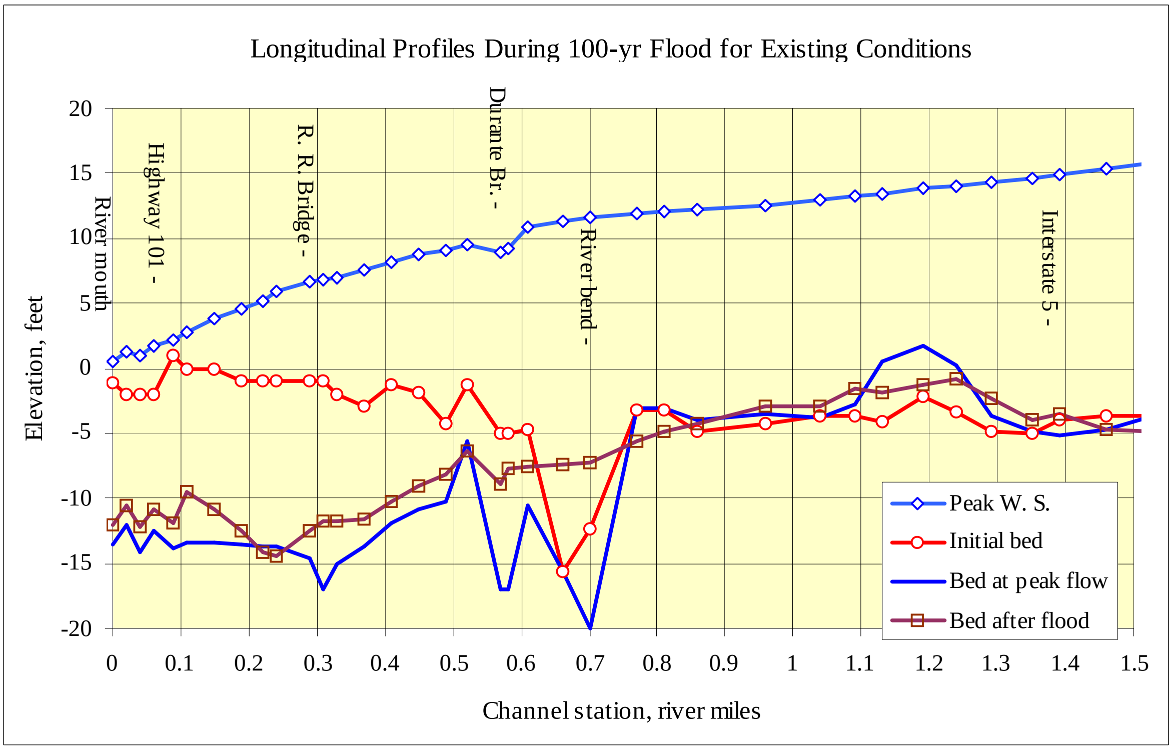
Scour potential throughout the lower reaches of the San Dieguito River was also evaluated with the computer model FLUVIAL-12, developed by Dr. Howard Chang (1984, 1988, 1994, 1997). Unlike the HEC-2 model, FLUVIAL-12 simulates the combined effects of flow hydraulics, sediment transport, and river channel changes for a given flow period. These interrelated changes are coupled in the model for each time step, simulating channel bed scour and fill and taking into account physical constraints such as bank protection, grade control structures, and bedrock outcroppings. The model also addresses the impacts of general scour at bridge crossings, response to sand and gravel mining, and channelization (Chang 1997). Of greatest significance are model predictions regarding scour at the mouth of the lagoon during severe flood flows, which results in a substantially lower computed water-surface elevation near the mouth of the river. The model also accounts for river scour that would naturally occur elsewhere within the riverine system, where man-made constrictions into the floodplain accelerate flood flows. The computed water-surface elevations from the 100-year flood, based on the FLUVIAL-12 model, are also presented in

Table 2.15, with a graphical presentation of both the water-surface profile and channel bed elevations shown in Figure 2.27 (Chang 2004). Also shown on the figure is the significant riverbed scour in the vicinity of the bridges and downstream sections of the river. Following the 100-year flood, the predicted channel bed elevation at the river mouth would be approximately –11 feet, or substantially lower than the existing river mouth elevation. Scour channel widths from the Jimmy Durante Bridge to the river mouth range from 260 feet to 700 feet and locally much wider further upstream.

2.6.5 Lagoon Hydraulics

Coastal lagoons are protected from coastal waves and permit large habitat diversity. It is the tidal exchange or lack thereof that controls biologic diversity within the lagoonal system. When the river mouth is closed, a brackish, and eventually freshwater, system is fed predominantly by upland sources. Changes in water level occur slowly due to the offsetting of evaporation and percolation into the aquifer by riverine flows fed by rainfall, irrigation, and other domestic runoff. When the channel mouth is open, however, tidal exchange becomes the dominant factor in controlling lagoonal habitat. The type of lagoon habitat is determined by the percent of time the organisms are exposed to air versus inundated by tidal water. The percent time of aerial exposure is in turn a function of the local elevation of lagoon topography. The function that relates local elevation to exposure time is the hydroperiod function. Figure 2.28 gives the hydroperiod function of the existing San Dieguito Lagoon (blue dashed line) and shows how it will be modified by the restoration plan to be built by SCE (red line). Overlaid on these curves are the divisions between habitat types as determined from habitat surveys of the existing lagoon by Josselyn and Welchel (1999). We find that the restoration will lower the upper limit of subtidal habitat but raise the elevations of all the intertidal habitats relative to existing conditions. Because the area of the lagoon increases with elevation, this upward shift in the domains of low, mid and high salt marsh habitats insures that the restoration will result in a substantial net increase in the acreage of wetland habitat.

Inlet stability is determined primarily by the diurnal tidal prism within the lagoon. The tidal prism is the volume of water enclosed by the planes of mean higher high water (MHHW) and mean lower low water (MLLW) within the lagoon. (MHHW and MLLW represent the elevations of the average higher and lower of the semidiurnal daily tides, or a total elevation difference of 5.37 feet). The 12.4-hour tidal cycle provides the hydraulic gradient to push water into the lagoon during the rising tide and allow water to gravity-flow out of the lagoon during the subsequent falling tide. If the lagoon is to remain open, the outflow velocity (ebbing tide) must be sufficient to scour sand from the entrance channel that was deposited with a flooding tide. As much of the lagoon interior is above MLLW, the present tidal prism is substantially below its most efficient hydraulic capacity. As tidal migration within the inner reaches of the lagoon, especially at or above MLLW, is proportional to the water depth, continued siltation has a significant impact on tidal exchange throughout the entire lagoon. When the inlet is open and high waves and high tides also exist, waves can travel up the inlet. In most instances these waves are less than 2 feet high and dissipate by the time they reach the railroad bridge, causing wave erosion along the channel banks between the railroad bridge and the river mouth.



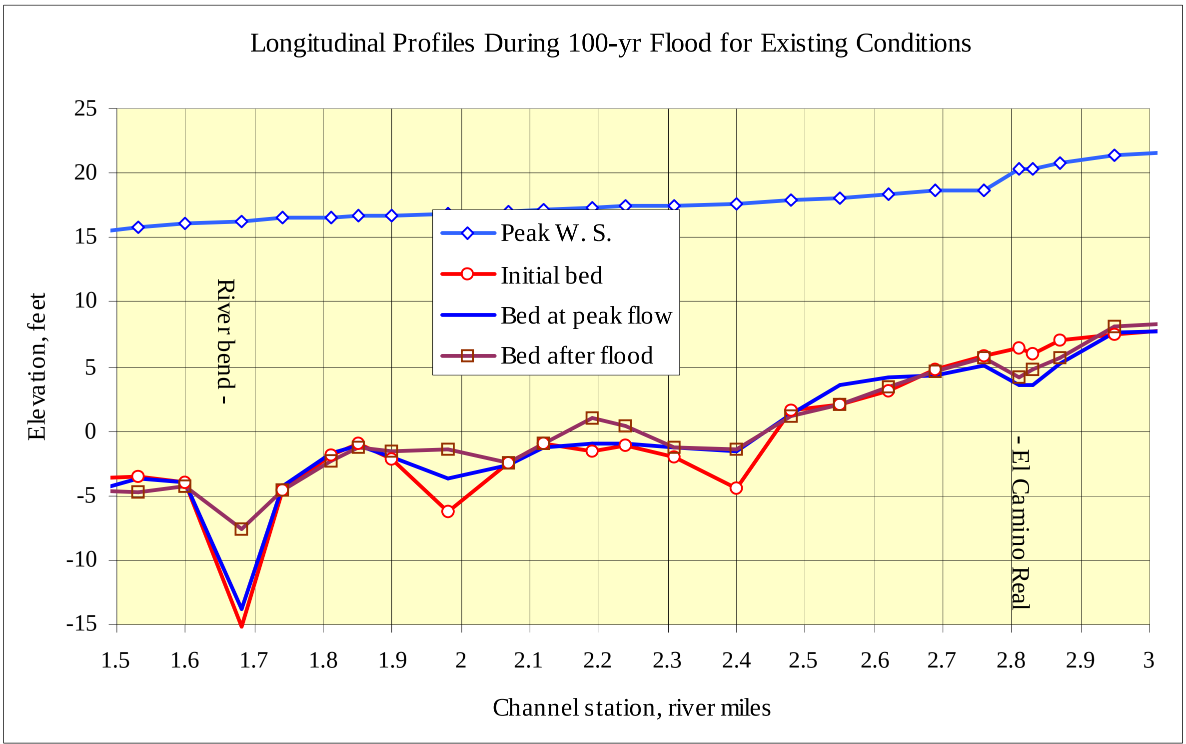


Figure 2.27. Simulated Changes in Water Surface and Channel Bed Profiles during the 100-Year Flood Under Existing Conditions

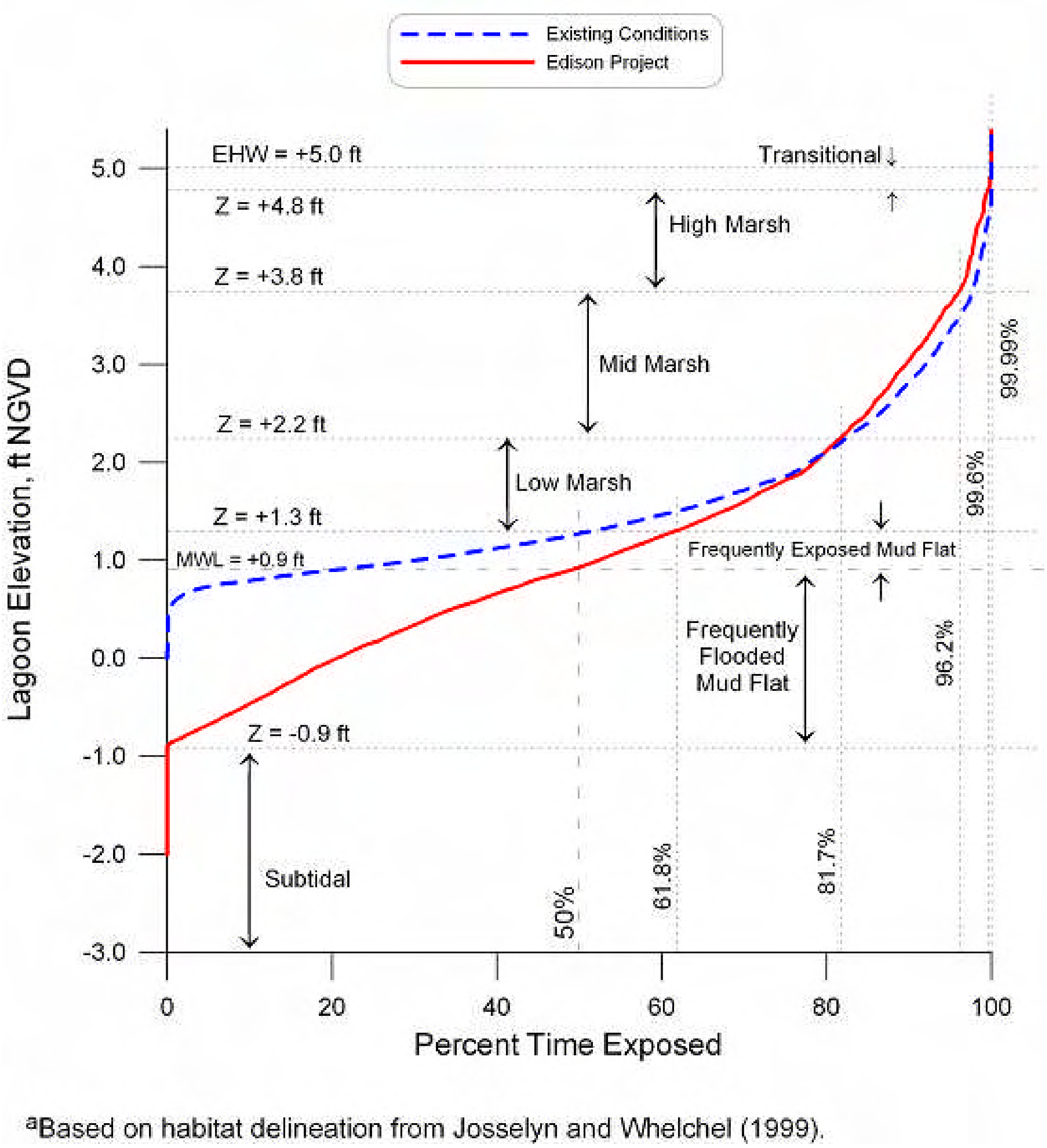


Figure 2.28. Hydroperiod function for the existing San Dieguito Lagoon (blue) and the proposed restoration with parcel W-16 and without W-6a and 6b (red).

2.6.5.1 Inlet Characteristics

The inlet to the San Dieguito River is a dominant feature along this section of shoreline. The geometry of the inlet both in the past and in the future determines the tidal exchange within the small lagoon. The inlet meanders, but it is essentially trapped between the quarry stone revetment on the south and the bluff headland about 750 feet to the north. The inlet geometry varies across the beach but becomes less varied as one proceeds into the lagoon. This is due to the presence of the bridge structures for Camino Del Mar and the railroad. The maximum observed natural channel depth in the inlet is about 7 feet below MSL. The maximum channel depth at the inlet location occurs as a result of scour by river currents during flood events.

The maximum channel width varies from 260 feet east of the railroad to 360 feet east of Camino Del Mar to over 600 feet along the beach. The channel east of Camino Del Mar is stabilized by the presence of a revetment along the southern boundary and by the presence of the two bridges and other improvements to the Fairgrounds.

2.6.5.2 Inlet Open/Closed Status

The inlet is closed periodically by the longshore movement of sand. When the inlet is closed, no tidal exchange occurs between the lagoon and the ocean. Over the past 50 years, direct observations of the inlet status (open or closed) have shown that river flooding is the major natural determinant of inlet conditions on time scales longer than a few years (Elwany et al. 1998).

Over short periods (months to years), the inlet status is determined primarily by the available tidal prism within the lagoon and by the littoral sand transport. Currently, the available diurnal mean tidal prism is about 195 acre feet. The tendency to remain open is vastly smaller during dry weather (12 percent) versus during periods of above-average rainfall (66 percent). To accurately describe the historic natural conditions, the conditions of the lagoon prior to 1905 must be considered. Prior to filling the historic wetland for highways, railroads, and development, as well as damming the river to create Lake Hodges, the historic records suggest that the river mouth was always open. By the 1940s, the historic natural condition had been so profoundly altered that the lagoon mouth closed for many years, opening occasionally as a result of significant storm events.

The inlet closure statistics of the last two decades (wet time period) show that the inlet is open 73% of the time (Table 2.16). The inlet closure statistics of the last two decades are the ones most relevant to the project environment because they reflect the effects of the proliferation of impervious surfaces and structures on river flow and sand supply. Historically, however, taking into consideration wet and dry time cycles in the weather, the Lagoon was open 34% of the time between 1929 and 1999 (Elwany et al. 1998).

Table 2.16. Inlet Status (Open Or Closed) at San Dieguito Lagoon, 1978 – June 2005

Year / Month	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05
January	O	O	O	c	c	O	O	O	O	O	I	O	c	C	O	O	O	c	C	O	O	O	C	I	I	I	O	O
February	O	O	O	O	c	O	O	O	O	O	O	O	c	C	O	O	O	O	c	O	O	I	C	O	C	I	O	O
March	O	O	O	O	O	O	O	O	O	c	O	C	I	c	I	O	O	O	c	O	O	I	C	O	I	I	O	O
April	O	O	O	O	O	O	C	O	O	I	I	C	c		I	O	O	O	O	O	O	I	C	O	C	I	I	O
May	O	O	O	C	O			O	O	c	O	C			C	O	O	O	I	O	O	C	C	O	C	C	I	O
June	O	O	O	C	O	O	C	O	O	O	O	I	C	C	C	O	O	O	O	O	O	C	C	O	C	C	O	O
July	O	O	O	C	O	O		O	O	O	O	C	C	C	C	O	O	O	O	O	O	C	C	O	C	C	O	
August	O		O	C	O	O	O	O	O	O	O	O	C		C	O	O	O	O	O	O	C	C	O	C	C	O	
September		O			O	O	O	O	O	O	O	c	C	C	C	O	O	O	I	O	O	C	c	O	C	c	O	
October		C	C	C	O	O		O	O	O	I	O	C	C	C	O	O	O	O	I	O	C	O	O	c	O	O	
November		I	C	C	O	I	c	O	O	I	I	C	C		C	O	O	O	O	I	I	C	O	I	I	O	O	
December	O	c	C	c	O	O	O	O	O	I	O	C	C	C	C	I	I	C	O	I	O	C	C	C	I	O	O	

O = Open Inlet
C = Closed Inlet
c = Artificially Opened Inlet
I = Intermittent Inlet

~~Table 2.16. Inlet Status (Open Or Closed) at San Dieguito Lagoon, 1978 - 2004~~

~~Year / Month~~	~~78~~	~~79~~	~~80~~	~~81~~	~~82~~	~~83~~	~~84~~	~~85~~	~~86~~	~~87~~	~~88~~	~~89~~	~~90~~	~~91~~	~~92~~	~~93~~	~~94~~	~~95~~	~~96~~	~~97~~	~~98~~	~~99~~	~~00~~	~~01~~	~~02~~	~~03~~	~~04~~
~~January~~	~~O~~	~~O~~	~~O~~	~~c~~	~~c~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~I~~	~~O~~	~~c~~	~~C~~	~~O~~	~~O~~	~~O~~	~~c~~	~~C~~	~~O~~	~~O~~	~~O~~	~~C~~	~~I~~	~~I~~	~~I~~	~~O~~
~~February~~	~~O~~	~~O~~	~~O~~	~~O~~	~~c~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~c~~	~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~c~~	~~O~~	~~O~~	~~I~~	~~C~~	~~O~~	~~C~~	~~I~~	~~O~~
~~March~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~c~~	~~O~~	~~C~~	~~I~~	~~c~~	~~I~~	~~O~~	~~O~~	~~O~~	~~c~~	~~O~~	~~O~~	~~I~~	~~C~~	~~O~~	~~I~~	~~I~~	~~O~~
~~April~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~C~~	~~O~~	~~O~~	~~I~~	~~I~~	~~C~~	~~c~~		~~I~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~I~~	~~C~~	~~O~~	~~C~~	~~I~~	~~O~~
~~May~~	~~O~~	~~O~~	~~O~~	~~C~~	~~O~~			~~O~~	~~O~~	~~c~~	~~O~~	~~C~~			~~C~~	~~O~~	~~O~~	~~O~~	~~I~~	~~O~~	~~O~~	~~C~~	~~C~~	~~O~~	~~C~~	~~C~~	~~O~~
~~June~~	~~O~~	~~O~~	~~O~~	~~C~~	~~O~~	~~O~~	~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~I~~	~~C~~	~~C~~	~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~C~~	~~C~~	~~O~~	~~C~~	~~C~~	~~O~~
~~July~~	~~O~~	~~O~~	~~O~~	~~C~~	~~O~~	~~O~~		~~O~~	~~O~~	~~O~~	~~O~~	~~C~~	~~C~~	~~C~~	~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~C~~	~~C~~	~~O~~	~~C~~	~~C~~	~~O~~
~~August~~	~~O~~		~~O~~	~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~C~~		~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~C~~	~~C~~	~~O~~	~~C~~	~~C~~	~~O~~
~~September~~		~~O~~			~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~c~~	~~C~~	~~C~~	~~C~~	~~O~~	~~O~~	~~O~~	~~I~~	~~O~~	~~O~~	~~C~~	~~c~~	~~O~~	~~C~~	~~I~~	
~~October~~		~~C~~	~~C~~	~~C~~	~~O~~	~~O~~		~~O~~	~~O~~	~~O~~	~~I~~	~~O~~	~~C~~	~~C~~	~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~I~~	~~O~~	~~C~~	~~O~~	~~O~~	~~I~~	~~O~~	
~~November~~		~~I~~	~~C~~	~~C~~	~~O~~	~~I~~	~~c~~	~~O~~	~~O~~	~~I~~	~~I~~	~~C~~	~~C~~		~~C~~	~~O~~	~~O~~	~~O~~	~~O~~	~~I~~	~~I~~	~~C~~	~~O~~	~~I~~	~~I~~	~~O~~	
~~December~~	~~O~~	~~c~~	~~C~~	~~c~~	~~O~~	~~O~~	~~O~~	~~O~~	~~O~~	~~I~~	~~O~~	~~C~~	~~C~~	~~C~~	~~C~~	~~I~~	~~I~~	~~C~~	~~O~~	~~I~~	~~O~~	~~C~~	~~C~~	~~C~~	~~I~~	~~O~~	

~~O = Open Inlet~~
~~C = Closed Inlet~~
~~c = Artificially Opened Inlet~~
~~I = Intermittent Inlet~~

2.6.5.3 Human Influences/Modifications

Up until the last few hundred years, the natural conditions of the lagoon were characterized by a lagoon mouth that was approximately 3,500 feet wide, dominated by sand bar-building processes, with the river mouth migrating from the existing headland (Scripps Bluff), north of the current river mouth, to a short distance south of 17th Street, which forms the southerly banks of the ancestral San Dieguito River (Kennedy and Peterson 1975). Fluvial processes continued to infill the San Dieguito River Valley, depositing alluvial sediments into the littoral zone during the larger flood flows and slowly building up the elevation of the valley floor during more quiescent times. The contemporary beach berm on which the Del Mar beachfront homes exist likely formed within the last 150 years in response to strong southerly storms, creating the northerly extending Baymouth Bar, with the river discharging near the northerly headland. Subsequent construction in this area, which has permanently altered the previous natural conditions, has maintained the river mouth at its present northerly extent, with the Baymouth Bar now supporting Camino Del Mar and the adjacent residential improvements on both sides of the roadway.

In the late 1800s, a railroad bed was constructed as a filled causeway across the lagoon mouth. Only a small trestle was used to allow flow between the lagoon and the ocean. The first permanent highway bridge was built in the early 1900s just west of the railroad trestle, with the majority of the roadbed on an infilled embankment extending into the lagoon with only a small opening to pass flood flows. Sometime thereafter, a third roadway, Jimmy Durante Boulevard, encroached into the lagoon southeast of what is today the Del Mar Fairgrounds. In 1965, a fourth causeway was built for I-5, approximately 1.3 miles upstream from the river mouth. In the 1970s, a rock revetment was constructed along the current southerly edge of the river mouth to protect beachfront properties along Sandy Lane. The revetment near the mouth of the lagoon has also confined the location of the inlet channel and prevented migration in response to littoral forces. These constrictions or choke points have altered the physical behavior of the lagoon over the last 100 years. These conditions promote the retention of beach materials, as well as fine-grained sediment from upland sources, within the lagoon. This, in turn, reduces the tidal prism and increases sedimentation rates in the lagoon, as well as the potential for future inlet closures. The presence of elevated floodplain encroachments, including those of the Del Mar Fairgrounds and the commercial development along Via de la Valle, further confine and define the tidal hydraulics within the lagoon.

Land-use practices and disturbance of natural land cover have increased erosion rates within the watershed and sediment delivery rates to the lagoon. The consequences of these human impacts are most prevalent within that portion of the upland watershed downstream from Lake Hodges Dam, where urbanization and the associated increase in impermeable surfaces has elevated base flows into the river system, increasing scour potential and sediment production.

Decreases in sediment supply to the littoral cell have changed the lagoon mouth in a manner that suppresses natural closures in the lagoon. The available sand supply within the Oceanside Littoral Cell (OLC) has been significantly reduced, and current longshore transport rates are often insufficient to overrun the tidal currents that would otherwise scour the channel entrance and keep the inlet open.

2.7 COASTAL PROCESSES

2.7.1 Oceanside Littoral Cell

The project study area is situated within the southern half of the Oceanside Littoral Cell (OLC). A littoral cell is a coastal compartment that contains a complete cycle of littoral (beach) sedimentation, including sources, transport pathways, and sediment sinks. The OLC extends for approximately 57 miles from Dana Point to Point La Jolla (Figure 2.29). The coast from Dana Point to La Jolla consists primarily of narrow, seasonal sand beaches backed by sea cliffs. Other coastal features include headlands, cobble beaches, rivers, creeks, tidal lagoons, man-made shoreline and bluff protection systems, and major harbor structures. The natural sources of sand for the beaches within the littoral cell are sediment discharge from rivers and streams and cliff erosion. Another source of sand for beaches is a beach nourishment project, where sand is taken from an inland source or another littoral setting and placed by man onto the beach. Sand moves along the shoreline predominantly to the south, with occasional reversals. The primary sinks for beach sands, where sands are permanently lost, are the Scripps and La Jolla Submarine Canyons at the southern end of the littoral cell (Figure 2.30). Coastal lagoons (Agua Hedionda, Batiquitos, San Elijo, San Dieguito, and Los Peñasquitos) may also serve as sand sinks. Lagoons that are dredged on a regular basis (Agua Hedionda and Batiquitos) function as a short-term (i.e., between dredging events) sediment sink. Those lagoons (San Elijo, San Dieguito, and Los Peñasquitos) that are not regularly dredged impound beach sand for protracted periods between major floods that scour the lagoons returning the littoral sand to the nearshore zone. Sand is diverted offshore, outside of the littoral system, by the Oceanside Harbor jetty system. In addition, Oceanside Harbor and Agua Hedionda Lagoon trap beach sands as they move along the shoreline. However, these sediments are periodically reintroduced back into the littoral system through maintenance dredging projects, and, therefore, are not permanently lost.

The OLC and the project area has been the subject of many shoreline studies since the early 1960s. Most of these studies were conducted by the USACE as part of their Beach Erosion Control Study Program. Shoreline retreat and beach erosion within the OLC and particularly in the Oceanside area were problems that warranted federal studies as far back as 1955. In addition, many of the more recent reports were produced by the USACE as part of the Coast of California Storm and Tidal Wave Study (Inman et al. 1986; USACE 1985, 1987a, 1987b, 1988, 1989, and 1991). Recently, the shoreline and unprotected coastal bluff segments in the OLC have experienced an increase in erosion due to long-term impacts of coastal urbanization. Damming rivers, sand mining, and hardening of the shoreline has resulted in significant narrowing of the beaches within the OLC, including the shoreline in front of the study area. While the shoreline throughout the OLC is eroding, the shoreline in the immediate study area is eroding at a comparatively slower rate, primarily due to sediment load input of the San Dieguito River.

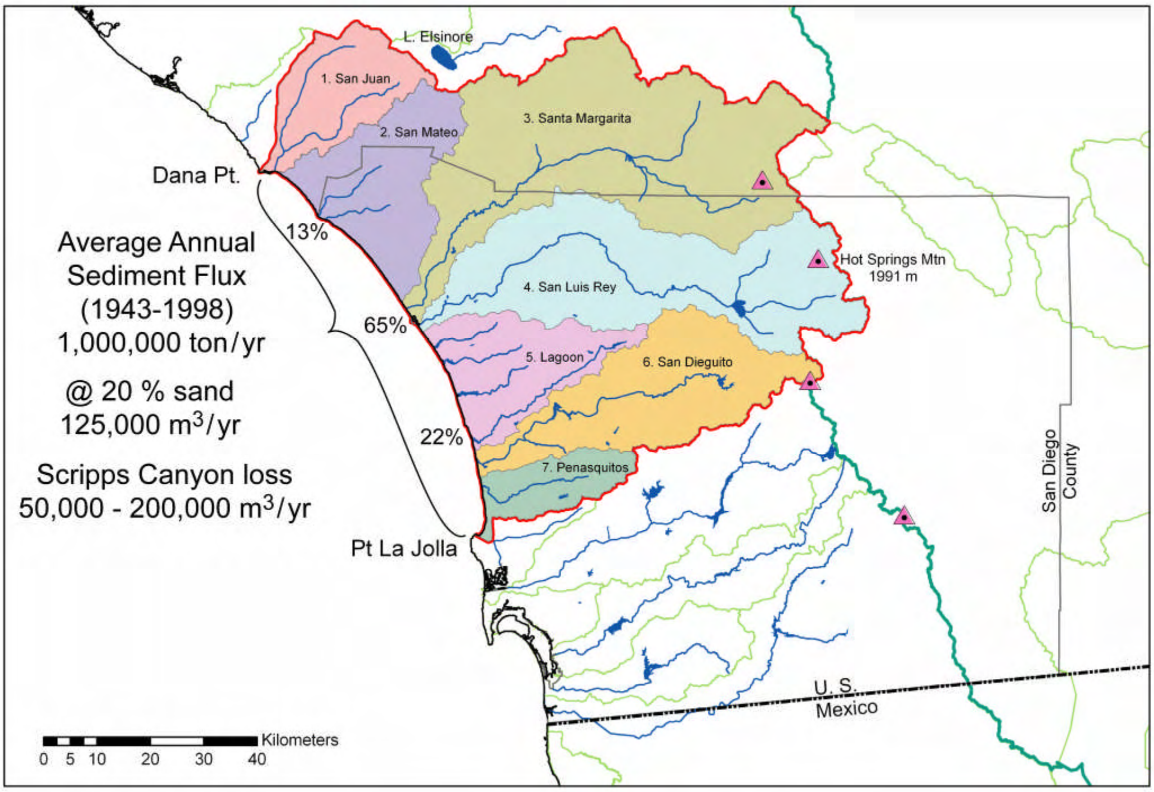


Figure 2.29. Drainage basins of the Oceanside Littoral Cell and relative contributions of littoral sediment

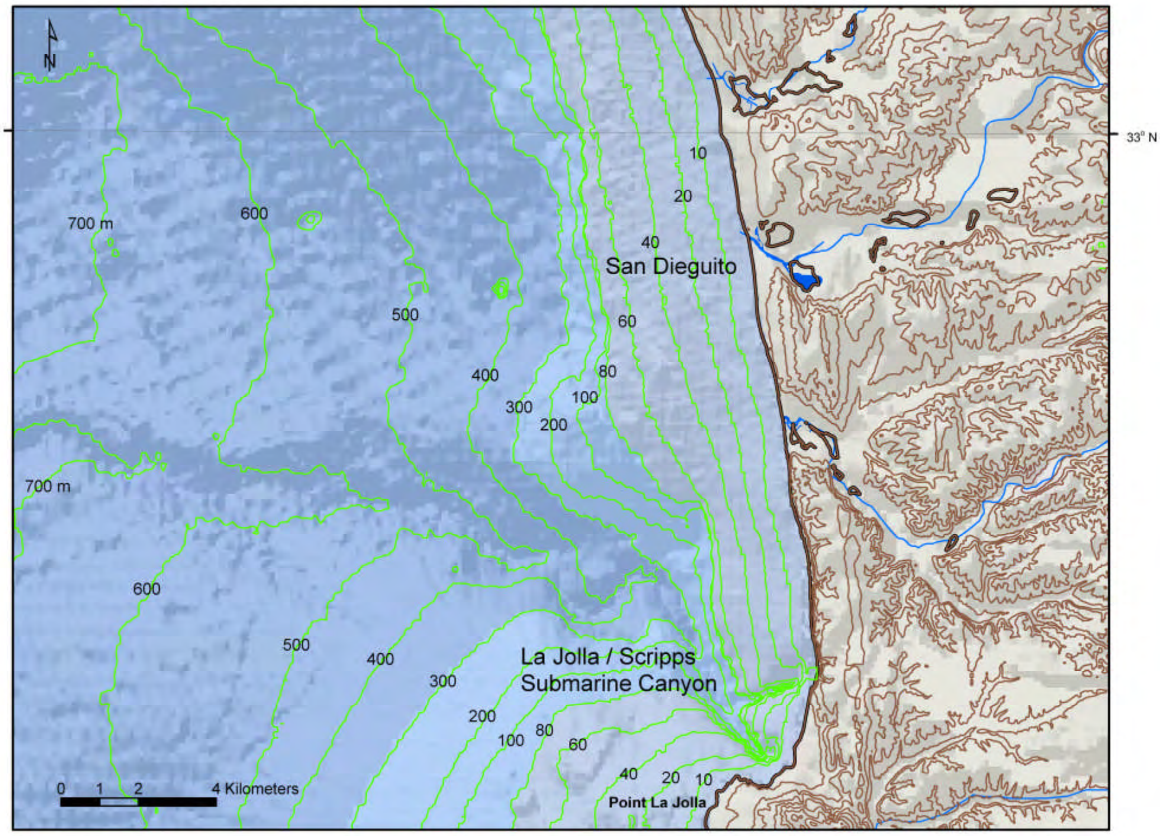


Figure 2.30. Coastal topography and nearshore bathymetry in the neighborhood of San Dieguito Lagoon and relative location to the terminal end of the Oceanside Littoral Cell at the La Jolla/Scripps Submarine Canyon

2.7.1.1 Beach Sediment Sources

Littoral sediments within the OLC originate primarily from the upland watersheds. Beach sands in the study area are a product of the erosion of the land within the littoral cell. These sands are delivered to the shoreline by the rivers and streams, erosion of the coastal cliffs, and beach nourishment (USACE 1991). There a 7 primary watersheds that discharge sediment into the OLC, delineated by the areas with color shading shown in Figure 2.29. The largest drainage basins are regulated by dams, which trap sands behind them. The resulting reduction in sediment load can be as much as 88 percent (San Dieguito River), but is more commonly about 50 percent (Santa Margarita River). Even so, the San Dieguito presently delivers 22 % of the average annual sediment flux to the OLC, while the San Luis Rey and Santa Margarita Rivers deliver 65 %. The various lagoons and marshes are not considered to contribute significant amounts of sediments to the shoreline. The total amount of sediment arriving at the coast from rivers and streams varies from 53,000 to 426,000 cubic yards per year (USACE 1991) but averages 160,000 cubic yards per year (125,000 cubic meters per year, USACE 1991). The total cumulative deficit of sand yield to the beaches as a consequence of damming of rivers is estimated to be 27,000,000 cubic yards (Jenkins and Wasyl 1998).

In addition to sand beaches, extensive shingle (gravel) beaches exist throughout most of the OLC. This shingle, which became exposed during storms in 1980 and again in 1983 (Kuhn and Shepard 1984), originates from the upland watersheds of North County, where Eocene-age cobble conglomerates occur locally with maximum thicknesses upward of 500 feet (Kennedy and Peterson 1975). While the conglomeratic formations are incised by rivers, such as San Marcos Creek (Batiquitos Lagoon), the eroded sediments (gravels, sands, silts and clays) are transported to the coast and deposited in nearshore deltas, where they feed the littoral system. The finer fraction is lost first, and the sands begin their longshore migration until they are intercepted by a submarine canyon or deposited offshore in water depths too great for later onshore movement. The gravels and cobbles, being larger and, hence, less susceptible to longshore and seasonal offshore-onshore movement, tend to accumulate on the shore platform or on deeper scoured sand surfaces (as in the case of river mouths and the low-lying areas of Del Mar) and are re-exposed during periods of sand depletion. A shingle beach is only intermittently exposed along Del Mar following periods of intense storm activity that remove the beach sands, exposing the more erosion-resistant shingle.

Coastal bluffs ranging in height from 10 to 350 feet occur along about 90 percent of the shoreline in the OLC. The bluffs, when not protected by a wide sand beach, will erode when subject to wave attack. Bluff erosion is episodic and can occur as an isolated event at a limited area for site-specific causes. The northern end of the shoreline within the study area is characterized by coastal bluffs. Historically, the coastal bluffs have contributed beach sediments to the littoral system.

Beach nourishment and sand bypassing have occurred on numerous occasions within the OLC. The primary sites for beach nourishment have been in front of Agua Hedionda Lagoon, south of the Oceanside Harbor, in front of the San Onofre Nuclear Generating Facility, and at Doheny State Beach. Sand bypassing, in which sand is artificially passed around a littoral barrier, has taken place at Oceanside Harbor and Agua Hedionda.

Approximately 12,800,000 cubic yards of sand have been artificially placed on the beaches in the OLC, and about 18,200,000 cubic yards of sand have been bypassed around coastal structures within the cell (Elwany 1999 and Jenkins and Wasyl 1999a).

2.7.1.2 Beach Sediment Sinks

Coastal structures within the OLC and the study area determine to some extent the configuration of the shoreline and beach profile. As sand moves along the shoreline, it ultimately ends up at a location where it cannot return to the littoral cell. This location is called the sediment sink. There are three submarine canyons within the OLC. Carlsbad Canyon lies in the middle of the littoral cell, but it is believed that the canyon is too far offshore to be an active sink for littoral sediments. The primary sink for beach sands is Scripps Submarine Canyon, which intercepts most of the southward-moving sand before it reaches La Jolla Submarine Canyon (Figure 2.30). The OLC loses 65,000 to 260,000 cubic yards per year (50,000 to 200,000 cubic meters per year, USACE 1991) due to turbidity currents in the Scripps and La Jolla Submarine Canyons that relieve sediment overburden around the canyons. This overburden builds up from the continuing net flux of longshore transport toward the southern end of the OLC.

2.7.1.3 Longshore Transport

Longshore transport of sediment by currents has been studied by numerous investigators during the past 30 years. The Coast of California Storm and Tidal Wave Study (USACE 1991) contains a discussion of the methodology and conclusions of these studies. The rate at which sand is moved along the shoreline is controlled by wave energy and the availability of moveable sediment. The longshore transport rate in the Del Mar vicinity from 1945-1977 ranged between 100,000 and 250,000 cubic yards per year. As the availability of moveable sediment became increasingly scarce, the longshore transport rate declined, and from 1978-1987 it ranged from zero to 40,000 cubic yards per year. The direction of sediment transport depends upon the direction of the wave energy. Waves that approach from the north and northwest tend to drive sands to the south. Waves from the south and southwest tend to drive beach sands to the north. Historically the net annual transport has been to the south driven by the prevailing northwesterly direction of waves entering the Southern California Bight (Figure 2.31). However, in recent years the net annual transport has been reversing episodically to the north with the occurrence of strong El Nino events and multi-decadal climate shifts (Figures 2.32 and 2.33; see Jenkins and Wasyl, 1998). The direction of net annual transport in the future will depend on the dominant direction of wave energy, and the net transport will greatly depend on the availability of moveable sand.

2.7.1.4 Cross-Shore Transport

Waves and wave-driven currents are responsible for changing the shoreline in the study area. Wave-driven currents not only move sand up and down the coast but also on and offshore. Transport perpendicular to the shoreline is termed cross-shore transport. Cross-shore transport is responsible for the seasonal changes in the width of the beach. The cross-shore transport rates change seasonally due to the seasonal variation in wave energy reaching the shoreline. During winter months, sand is transported offshore. This results in a narrow sand beach and sometimes a cobble beach within the study area. Following periods

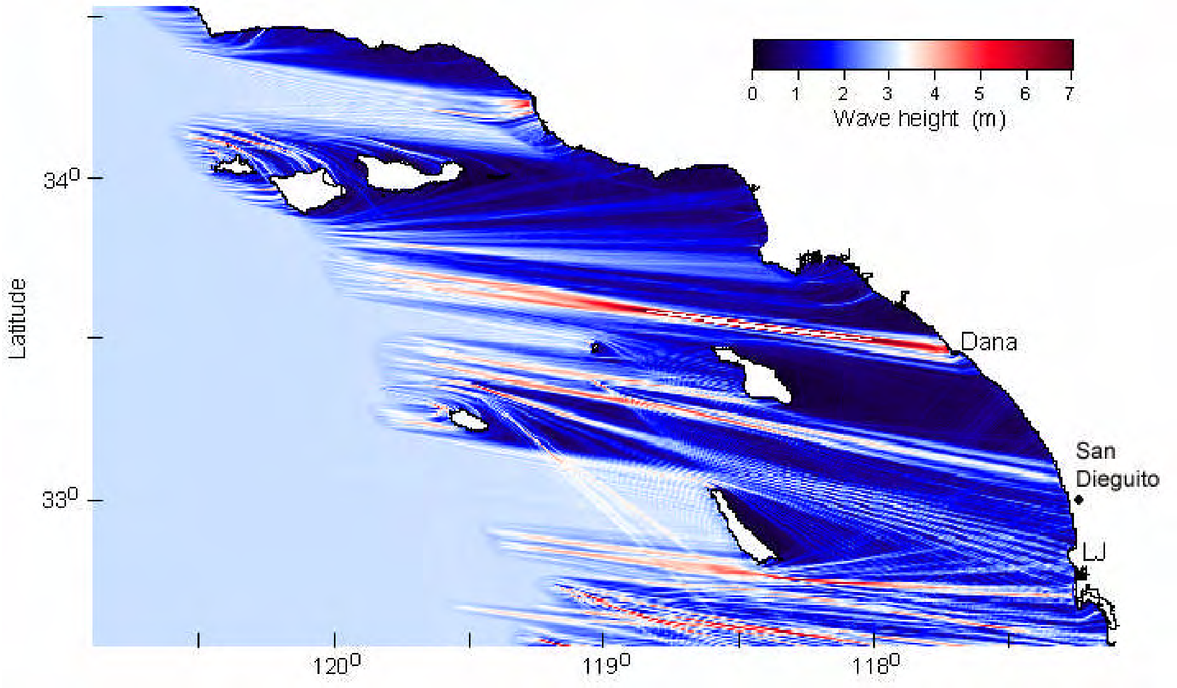


Figure 2.31. Refraction/Diffraction pattern of the Southern California Bight due to prevailing northwesterly swell, 13 January 1993: Deep water Wave Height = 3 m; Period = 15 sec; Direction = 285 degrees true

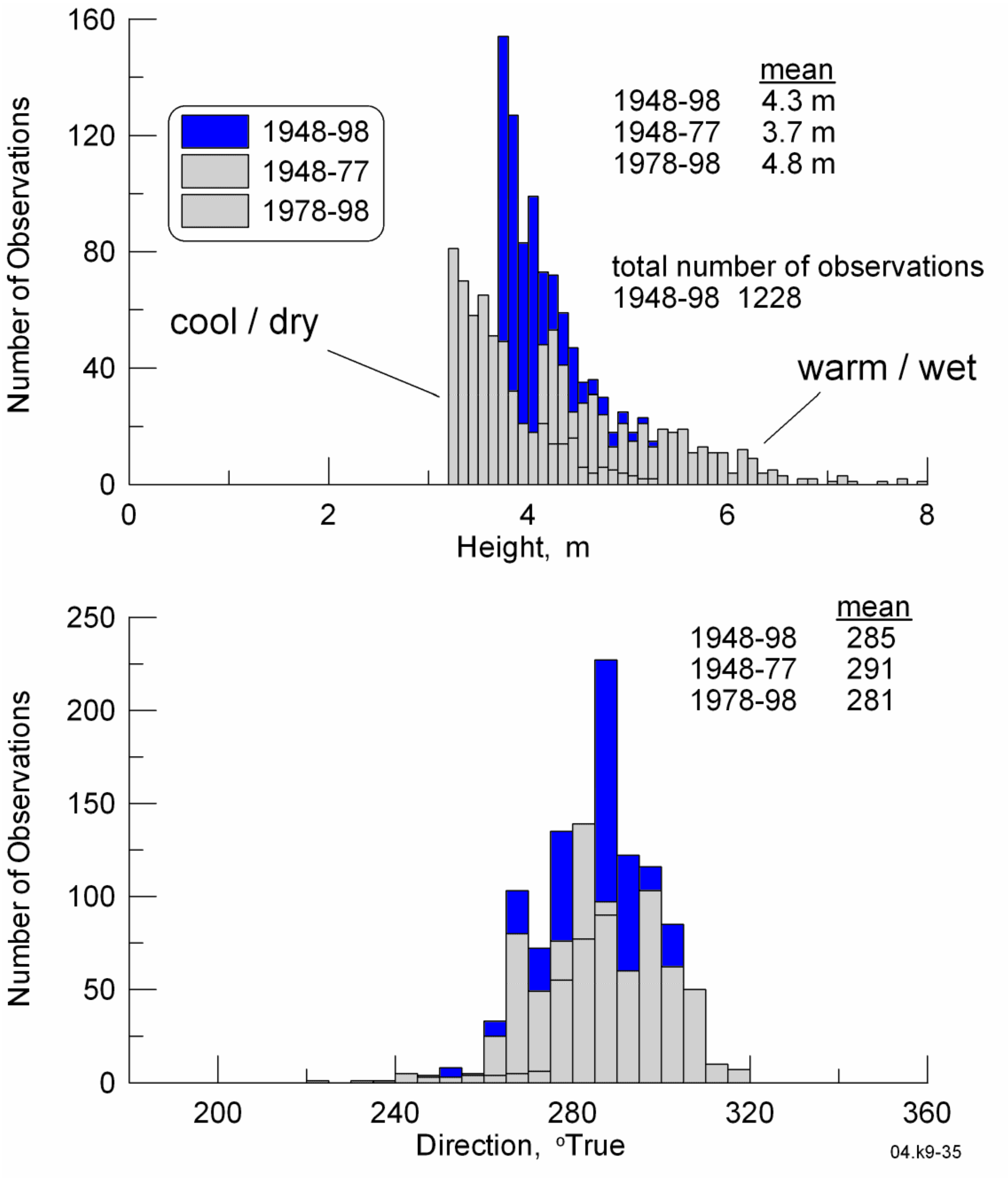


Figure 2.32. Comparison of wave height and direction histograms of the highest 5% waves entering the Southern California during multi-decadal climate periods (data from Graham 2003)

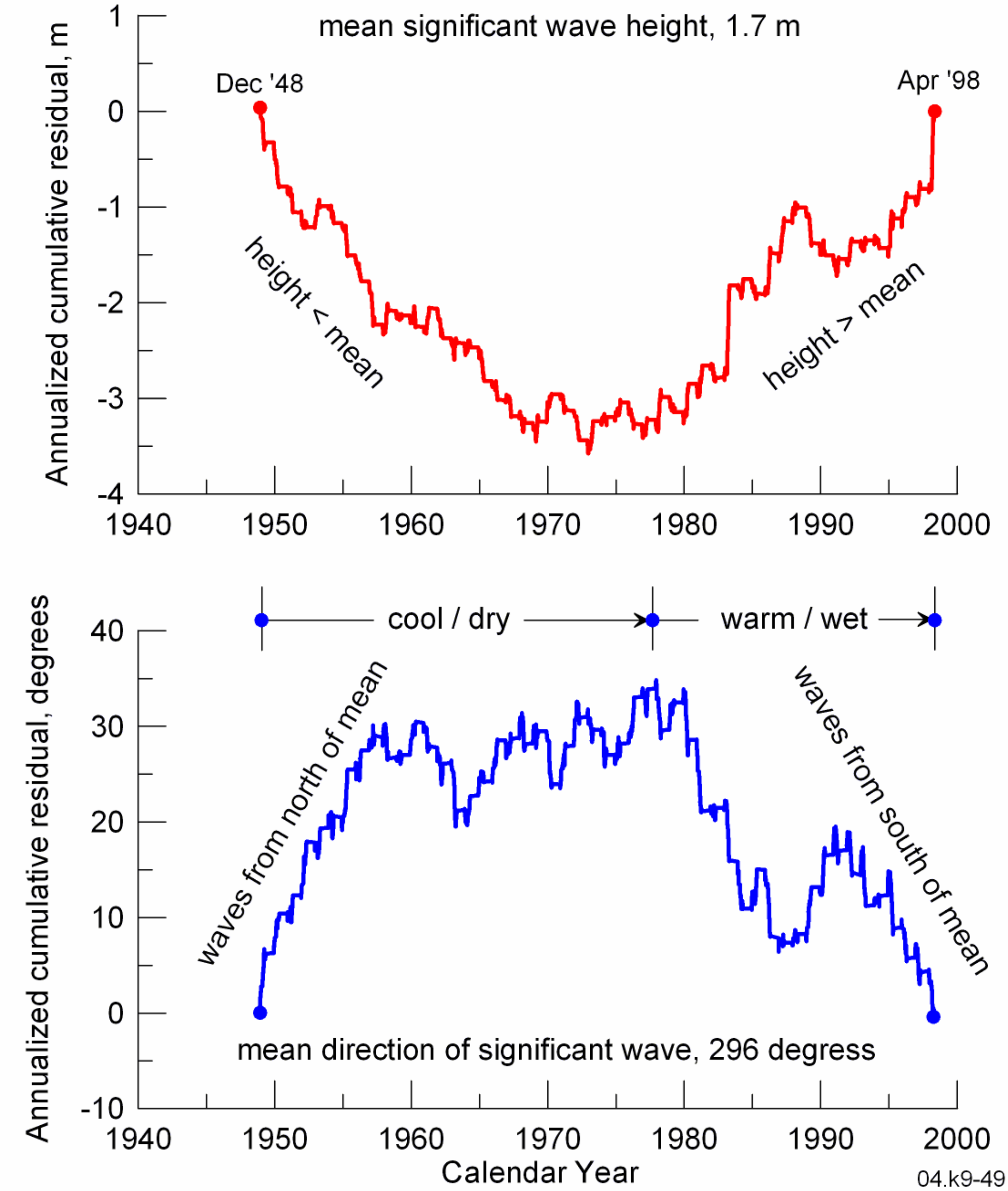


Figure 2.33. Comparison of wave height and direction cumulative residuals for Southern California multi-decadal climate periods (data from Graham 2003)

of large waves, portions of the beach within the study area only exist at lower tides. During summer months and periods of smaller waves, the sand is transported onshore resulting in a wider beach. The depth of water offshore at which the beach profile does not change is about 35 feet below MSL.

2.7.1.5 Sediment Budget

Sediment budgets are used to quantify the combined influence of sediment sources, sediment transport, and sediment sinks likely to cause a change in shoreline position. Sediment budgets are also used to forecast future net changes in the shoreline. The USACE completed a detailed analysis of a sediment budget in 1987 and again in 1991 as part of the Coast of California Storm and Tidal Waves Study. They concluded that, in general, the OLC has a growing sand deficit of about 27 million cubic yards in 1991. Beaches in the Del Mar study area are eroded by wave action and are very dependent upon the re-supply of sand by the San Dieguito River to replace the losses.

2.7.2 Nearshore Currents

Nearshore currents move sand along the shoreline and into and out of the coastal portion of the study area. There are four primary sources for nearshore currents: (1) wave-driven currents, (2) wind-driven surface currents, moving approximately in the direction of the wind, (3) tidal currents, which trend parallel to shore and switch direction with the falling or rising tide, and (4) currents near the mouth of the San Dieguito River resulting from river flow and/or tidal exchange within the wetland.

Currents offshore of the surf zone are primarily tidal-driven and weak (velocities of inches/sec) compared to typical surf zone currents. Typical wind-driven surface currents within the surf zone are also small when compared to the wave-driven currents. Waves are the primary source of energy that drive currents within the surf zone. Larger waves produce stronger currents. There are two types of surf zone currents, on-offshore currents and longshore currents. The first type moves sands in the on-offshore direction. The most familiar on-offshore current is a rip current. Rip currents commonly occur in the study area and, under large wave conditions, can travel in excess of 3.3 feet/sec (Inman et al. 1986). Longshore currents move sands along the shoreline, typically from north to south and occasionally from south to north (USACE 1991). The strength of the longshore current increases with wave height. Under large wave conditions, longshore current velocities can reach 5.3 feet/sec or greater (Inman et al. 1986).

River currents and tidal currents are the dominant currents at the San Dieguito River inlet. River flow into the surf zone during major rainfall events is by far the strongest current. River flows at the Highway 101 Bridge can be as strong as 10 feet/sec. The river flow may be slightly augmented by the existing ebb tidal flow leaving the estuary. The nominal existing tidal flow when the inlet is open is about 1 foot/sec with peak flows as much as 3 feet/sec. The actual tidal flow varies depending upon the tidal range and the height of the sill across the inlet. For low flow conditions, the river currents are dissipated within the surf zone. During flood flows, the river currents can extend out beyond the surf zone, forming a plume with the fine grain sediment-laden waters.

2.7.3 Sea Level and Tides

The level of the ocean (sea level) plays an important role in coastal processes and shoreline erosion. As sea level rises, the shoreline moves further toward land. This enables waves to erode the shoreline further back on the beach profile. Sea level is primarily influenced by the tides (sun/moon gravitational effect). The mean tide range is about 3.7 feet, with the lowest annual tide at about -2.0 feet MLLW datum and the highest annual tide at about 7.8 feet MLLW (USACE 1989, 1991). MLLW is 2.75 feet below mean sea level. The diurnal range is 5.4 feet while the extreme range is near 10 feet. Table 2.17 shows the relationship of the tidal datums and the extreme observed water levels.

Table 2.17. Water Levels at La Jolla

	Datum MLLW (ft)
Highest Observed Water Level (Nov 13, 1997)	7.94
Mean Higher High Water (MHHW)	5.37
Mean High Water (MHW)	4.62
Mean Sea Level (MSL)	2.75
National Geodetic Vertical Datum (NGVD)	2.56
Mean Low Water (MLW)	0.93
Mean Lower Low Water (MLLW)	0.00
Lowest Observed Water Level(Dec 11, 1933)	-2.6

Sea level in the study area is also influenced by winds, waves, low pressure systems, and short- and long-term climatic events. Strong winds and high waves can pile water up along the shoreline, resulting in a rise in sea level. Extreme low pressure systems, such as hurricanes, can also result in a rise in sea level. The combined effects of wind, waves, and low pressure can raise sea level to a maximum of about 1 foot. However, this storm-induced rise in sea level is over a relatively short period of time, such as a few days. During inter-annual large-scale climatic events, such as the El Niño in 1982-83, sea level was about 0.85 feet higher than normal for 1 to 2 years (USACE 1989, 1991). During November of 1997, sea level reached a maximum height of 7.94 feet above MLLW. Analysis of sea level observations over the last nine decades suggests a mean rate of sea level rise of 0.64 feet per century. Sea level is expected to rise about 0.2 feet over the next 25 years as a result of long-term climate effects, such as global warming (USACE 1989, 1991).

2.7.4 Waves

Waves provide the primary energy responsible for driving coastal processes. There are two types of waves, known as sea and swell, that reach the study area. Sea waves are generated by local winds and have a short period (less than 7 seconds between successive waves) and a low height (usually less than 3 feet). Swell waves are generated by distant storms and travel hundreds to thousands of miles before reaching the study area. The period of swell waves is longer (7 to 20 seconds), with swell wave heights ranging from 1 foot to 20 feet. Swell waves tend to have the greatest impact on the shoreline because swells provide the majority of the energy responsible for moving beach sands.

Swell waves approach the study area from different directions and vary in height and period. Figure 2.31 shows the typical pattern of wave shadows and bright spots for a prevailing northwesterly swell entering the Southern California Bight. A pronounced window effect is imposed by the offshore islands have on the wave energy that reaches the shoreline around San Dieguito Lagoon. There are three seasons that make up the annual wave climate in the study area: winter (October — March), transitional (April — June), and summer (July — September). Waves from the northwest generated by North Pacific extra-tropical storms predominate during winter. Southern Hemisphere extra-tropical storms produce southerly waves that impact the shoreline within the study area during summer. The offshore Channel Islands dissipate wave energy and modify deepwater waves before they can reach the shoreline. The nearshore wave shoaling is complex due to the various far-field effects influences attributable to island sheltering, diffraction, refraction, and the orientation of the coastline relative to distant wave sources (Figure 2.31). The bathymetry in the in the immediate neighborhood of San Dieguito Lagoon is generally parallel to the shoreline (Figure 2.30), although other near-field features produce local complexities in the wave shoaling patterns and drift rates. These near-field features are due to the continental shelf becoming abruptly more narrow to the south of the lagoon where the rim of the Scripps and La Jolla Submarine Canyon begins, and where the bedrock transitions from the Del Mar Formation to Ardath Shale.

In addition to the spacial variation of the shoaling waves around the lagoon, there are also long-term temporal variations associated with El Nino (ENSO) events that are modulated by multi-decadal climate oscillations. These climate oscillations are referred to as the Pacific Decadal Oscillation (PDO) and involve several decades of cool/dry climate followed by several more decades of warm wet climate. In addition to the rainfall and ~~streamflow~~stream flow variations that occur during these climate periods, the wave climate also displays a periodic change. Figure 2.32 shows that wave heights did not exceed 5 meters during the cool/dry phase of the PDO between 1948 and 1978. During the warm wet phase of PDO that followed (1978-1998) there were 52 daily observations of waves exceeding 5 meters, while mean wave heights increased by almost a meter over mean heights during the cool/dry period. Accompanying this increase in wave energy during the warm wet period was a 10o shift in the mean wave direction toward the south (Figure 2.32 and 2.33). These variations in wave height and direction result in a corresponding reduction in the southward directed littoral drift during the warm/wet periods with an increased potential for local erosion along down-drift beaches. The effect of these variations on local beach stability was carefully evaluated for both pre- and post-restoration conditions using long-term wave climate and sediment flux data. The restoration was found to produce no measurable change in the naturally occurring beach width cycles that accompany these climate cycles (Jenkins and Wasyl, 2004).

Breaking waves in the study area normally range from 2 to 5 feet, although waves of 6 to 10 feet are not uncommon. A shallow water wave gauge has been located off of Del Mar for the last two decades. The mean characteristic wave height according to the wave gauge is 6.2 feet. Large waves can impact the study area year-round and usually last about 2 to 3 days. Extreme event waves during times of high sea level are responsible for the majority of the shoreline erosion. Table 2.18 presents the significant wave height for extreme nearshore waves versus return period (recurrence interval) at Del Mar, based on wave gauge data and hind-casting conducted by the Scripps Institution of Oceanography.

Table 2.18. Significant Wave Heights at Del Mar

Return Period (years)	***Significant Wave Height (feet)***
5	13.0
10	14.5
25	16.5
50	18.0
100	19.4

Source: USACE 1991.

2.7.5 Shoreline Characteristics

The beaches in Del Mar are essentially a barrier sand spit in front of a river valley. The beaches immediately to the north of the San Dieguito River are seasonal sand/cobble beaches backed by coastal bluffs protected by intermittent shore protection structures.

The beaches immediately to the south of the San Dieguito River are characterized by a gentle offshore slope, steeper beach face, and narrow seasonal beach backed by shore protection. Most of the backshore region is stabilized by vertical sheetpile seawalls and stone revetments. These shore protection structures have been subject to wave runup and overtopping since construction. Overtopping of the revetments and seawalls has resulted in damage to residences behind the structures. Overtopping occurs annually, with extreme damage possible during the coincidence of high tides and high waves when the beach fronting the structures is eroded away. A quarry stone revetment on the southern embankment of the tidal inlet acts much like a jetty. This revetment provides partial protection for the adjacent homes from wave overtopping and fixes the southern boundary of the inlet.

In general the Del Mar beaches have been stable in historical times (USACE, 1991) due to sediment supplied by the San Dieguito River. Although there have been episodes of beach erosion in Del Mar, these have been associated with extreme storm events such as the 1983 El Nino. Surveys by the US Army Corps of Engineers and Flick et al, 1986 have shown that the Del Mar beaches have always recovered rapidly following these storms, and over the long-term (1940-1990), Del Mar beaches have either remained unchanged or have only slightly accreted. These same surveys have shown that outlying beaches to the north in Solana Beach, Cardiff, and Encinitas began eroding after the 1970s due to diminished sand supply and littoral drift from updrift sources (Jenkins and Wasyl, 1998 and Jenkins 2000). Recent bluff failures to the north of the study area in the City of Solana Beach have resulted in shoreline retreat of as much as 10 feet.

2.8 WATER QUALITY

The following sections describe the quality of groundwater, surface waters, and coastal (marine) waters in the area.

2.8.1 Groundwater

Only a small portion of the San Diego region is underlain by permeable geologic formations that can accept, transmit, and yield appreciable quantities of groundwater. The principal groundwater basins in the San Diego region are confined to small, shallow, alluvial-filled valleys. Within the lower reaches of the San Dieguito River Valley, which is typically 2,000 feet wide and locally up to 6,000 feet wide, the estimated thickness of the aquifer is only 100 to 150 feet. M&T Agra (1993a) indicated that sediments that form the aquifer consist primarily of interbedded sands and silts, with occasional clay lenses.

Groundwater development in the lower reaches of the San Dieguito River Valley has been limited primarily to shallow alluvial aquifer wells adjacent to the San Dieguito River. The nearest producing well is on the north side of the valley, approximately 4,500 feet upstream from El Camino Real, and the main center of groundwater withdrawal is 1.25 miles upstream. These wells have been developed primarily for agricultural uses. Although appreciable amounts of water have been extracted from wells located east of El Camino Real, groundwater quality degrades dramatically to the west in the area of the San Dieguito Lagoon. Groundwater quality most likely degrades as a result of saltwater intrusion under the lagoon, although few data are available to characterize groundwater salinities. A boundary forms between fresh and salt groundwater because of the difference in specific gravity. Fresh groundwater is 2.5 percent lighter than salt groundwater, and will float on top of the salt groundwater. The location and shape of the interface depends on the hydrodynamic balance between salt and fresh groundwater. The ocean and tidal flows provide a constant source of salt groundwater to the underlying sediments. This balances against the flux of fresh groundwater flowing down the alluvial aquifer. In the San Dieguito River aquifer, pumping appears to seasonally lower the groundwater table approximately 10 feet at the main location of withdrawal 1.25 miles upstream from El Camino Real (Hargis 1998, 1999). This causes a temporary reversal of flow in the downstream portion of the alluvial aquifer, thus promoting saltwater intrusion. The extent and impact of this problem has not been quantified.

The Water Quality Control Plan for the San Diego Basin 9 (California Regional Water Quality Control Board 1994) indicates that the study area is located within the Solana Beach hydrologic area of the San Dieguito Hydrologic Unit, Basin No. 5.10. The beneficial uses of groundwater in this area have been designated municipal, agricultural, and industrial.

However, these beneficial uses do not apply in areas west of the easterly boundary of the I-5 right-of-way, and this area is exempt from the policy pertaining to sources of drinking water.

2.8.2 Surface Waters

Water quality (temperature, salinity, pH, light transmittance/clarity, and dissolved oxygen and nutrient concentrations) in San Dieguito Lagoon reflects freshwater and seawater inputs, conditions and processes within the watershed, and biological and physical processes within the lagoon. Previous studies of coastal lagoons have shown that inlet closures and restrictions to tidal mixing with seawater can have profound effects on water quality. Tidal exchange between the lagoon and the ocean moderates seasonal changes in water quality conditions that would otherwise accompany inlet closure. Natural processes (sand accretion due to alongshore transport) periodically close the tidal inlet. Between October 1994 and September 1997, Boland (1998) estimated that the inlet to San Dieguito Lagoon was open approximately 90 percent of the time. Following closures, the inlet is re-opened either artificially (by bulldozing) or by wave and river current scouring.

Over the past century, conditions within San Dieguito Lagoon have been altered due to man's influence. These changes include reductions in open water areas due to filling and sedimentation associated with construction activities. During 1940 to 1974, water quality within the lagoon was affected by discharges into the San Dieguito River of approximately 200,000 to 300,000 gallons per day of sewage from treatment ponds. During this period, a layer of sludge up to 18 inches thick formed in parts of the channel. These sewage inputs ceased when the City of Del Mar was connected to the municipal (City of San Diego) wastewater treatment system. Further, portions of the project area were used as a Naval Air Station, a municipal airfield, and an unlicensed landfill (MEC 1992). During 1983-1984, approximately 500,000 cubic yards of sediments were dredged from the area presently known as the Fish and Game Basin. This effort was conducted, in part, to increase the tidal prism and promote water movement and mixing within different areas of the lagoon.

The San Dieguito Lagoon and surface waters within the upstream watershed are not 303(d) listed water bodies, which are defined by Section 303(d) of the Clean Water Act as those surface waters, which do not meet water quality standards. However, it should be noted that the adjacent San Dieguito River mouth is a 303(d) listed water body that is impaired for indicator bacteria. Subsequent monitoring data indicate that the ocean waters (River Mouth) are not impaired for indicator bacteria. This issue is discussed in more detail in Section 2.8.3.1.

2.8.2.1 Temperature

Coastal Environments (1993a) performed weekly water quality measurements in both surface and bottom waters at nine locations within the Lagoon over a 1-year period (1992-1993). Values for several water quality parameters, including temperature, are summarized in Table 2.19 for the West (the portion of the river located between the Jimmy Durante Road and Highway 101 bridges), North (the portion of the river located between I-5 and the sharp bend in the river channel at mile 0.6), and South (the channel that connects the Fish and Game Basin to the river) channels.

Table 2.19. Summary of Water Quality Data Collected Within San Dieguito Lagoon (1992-1993)

	Temperature (ºC)	***Salinity (ppt)***	***Dissolved Oxygen (mg/L)***	***pH***
West Channel	7-33	0.2-43	1.6-14.3	7.0-8.9
North Channel	10-30	0.2-44	0.4-12.7	6.4-8.6
South Channel	9.4-31	0.8-46	3.3-12.3	7.2-8.8
Fish and Game Basin	10-32	1.4-48	3.6-13.3	6.9-9.0

Source: Coastal Environments (1993a).

Lagoon waters exhibited a wide temperature range (7 to 33 ºC), which reflected the effects of daily and seasonal heating cycles and inputs and mixing of freshwater and seawater sources at individual locations. For example, water temperatures at a single location varied over a tidal cycle by as much as 2 degrees, while variations in temperatures of up to 10 degrees occurred at different locations during a single sampling survey. The maximum difference between surface and bottom temperatures was 2 degrees. However, the overall ranges in temperatures within different portions of the Lagoon were similar (Table 2.19).

Boland (1998) performed biweekly temperature measurements in near-bottom waters at five locations within the Lagoon over a 3-year period (1994-1997), including 2 dry years and 1 wet year. These measurements were performed at approximately the same time of day to minimize daily (diurnal) variation. Temperatures of bottom waters varied seasonally from approximately 13 to 22 ºC, with colder temperatures in winter (December through February) and warmer temperatures during late summer (August and September). Temperatures within the Fish and Game Basin occasionally were up to several degrees warmer than water temperatures in other areas of the lagoon. Otherwise, temperatures at different areas typically did not vary by more than approximately two degrees during individual surveys.

For comparison, water temperatures in Batiquitos Lagoon in 1997 (following completion of restoration) ranged from about 13.5 to 25 C (Merkel & Associates 1997). Prior to restoration, water temperatures in the lagoon were on average 6 C warmer than the adjacent ocean waters (CH2M Hill 1989). These differences between pre- and post-restoration conditions reflect the moderating effects of continuous mixing with seawater on water temperatures within a coastal lagoon.

2.8.2.2 Salinity

Salinity values for coastal lagoons are expected to vary widely depending on the inputs and mixing of freshwater and seawater and effects of evaporation.

Coastal Environments (1993a) measured salinities in San Dieguito Lagoon waters from 0.2 to 48 parts-per-thousand (ppt). Similar salinity ranges occurred within each of the four general regions of the lagoon. Lower salinity values occurred during winter following periods of rain, whereas the highest salinity conditions occurred during summer, reflecting the effects of higher seasonal evaporation rates.

Boland (1998) measured salinities in San Dieguito Lagoon bottom waters from 15 to 40 ppt, although values typically were within the 25 to 33 ppt range. Low salinity conditions typically were short-lived (less than four weeks) during a period in which the lagoon inlet was open 90 percent of the time. During portions of the year, salinity values in areas east of I-5 were up to 15 ppt lower than those in waters near the inlet, reflecting relatively higher contributions from freshwater than in other areas of the Lagoon. Periodically elevated bottom water salinities within the Fish and Game Basin reflected the effects of evaporation and poor exchange with waters in the main channel. Periods of low salinity conditions may persist for weeks, depending on the volume of freshwater inputs and extent of tidal exchange with the ocean.

For comparison, the salinity of waters within Batiquitos Lagoon presently ranges from 28 to 34 ppt. However, prior to restoration, salinity values exhibited much greater seasonal variability, with typical salinities from 0 to 10 ppt during winter and 30 to 40 ppt during summer, although salinities up to 100 ppt were reached during drought years (Merkel & Associates 1997).

2.8.2.3 Dissolved Oxygen

Dissolved oxygen concentrations in coastal lagoons can also vary widely depending on the influences of freshwater and seawater inputs, as well as on the daily and seasonal changes in photosynthesis and respiration rates by submerged vegetation.

Coastal Environments (1993a) reported dissolved oxygen concentrations within San Dieguito Lagoon waters ranging from 0.4 to 14.3 mg/L. The overall ranges in values for different areas of the Lagoon were generally similar, although the minimum concentrations measured within the South Channel and Fish and Game Basin (3.3 and 3.6 mg/L, respectively) were higher than those in the West and North Channel areas. This is important because prolonged exposures to low oxygen concentrations (less than 3 mg/L) can be stressful to aquatic organisms.

Boland (1998) noted that lagoon waters were well-oxygenated (3 to 8 mg/L) during periods when the tidal inlet remained open, whereas relatively low levels (1 mg/L) occurred when the inlet was closed and mixing was restricted. Low dissolved oxygen also followed periods of rainfall when large amounts of organic material with a high oxygen demand were transported into the Lagoon. Consistently low dissolved oxygen concentrations also occurred within the Fish and Game Basin, compared to other sites, which was attributed to the high abundance and respiration of submerged vegetation.

Dissolved oxygen concentrations within Batiquitos Lagoon presently range from approximately 5 to 8 mg/L. Prior to restoration, concentrations in the lagoon were much more variable, ranging from 1.6 to 18.6 mg/L (Merkel & Associates 1997).

2.8.2.4 Alkalinity/Acidity (pH)

The pH of lagoon waters can vary in response to seasonal differences in freshwater and seawater inputs and daily and seasonal variations in biological processes (photosynthesis).

Coastal Environments (1993a) reported pH values ranging from 6.4 to 9.1, with higher values occurring in autumn, probably associated with maximum seasonal photosynthesis rates. The ranges in pH values were similar for different areas of the lagoon. For comparison, the pH of Batiquitos Lagoon water ranges from 7.2 to 8.4 (Merkel & Associates 1997). This relatively small range reflects the greater exchange to the ocean and the large buffering capacity of seawater.

2.8.2.5 Water Clarity/Turbidity

No direct measurements of water clarity within San Dieguito Lagoon have been conducted. Based on observations in other coastal lagoons, water clarity is expected to reflect phytoplankton abundance, sediment resuspension, and sediment loads from runoff. Thus, conditions can be expected to vary seasonally in response to winter storms and biological cycles.

2.8.2.6 Nutrients

Nutrient (e.g., nitrate, phosphate, and silicate) concentrations reflect watershed influences, inputs and mixing of freshwaters and seawater, and biological processes (uptake and recycling by plants) within the lagoon. Runoff from agricultural, equestrian, and urbanized areas within the watershed and erosion of soils containing fertilizers can represent important sources of excess nutrient loads.

No recent nutrient data (i.e., collected within the past 10 years) exist for San Dieguito Lagoon. From 1979 to 1983, the Regional Water Quality Control Board, San Diego Region sampled nutrient concentrations in six coastal lagoons within San Diego County, including San Dieguito. Water samples were analyzed for total nitrogen (total inorganic nitrogen plus total organic nitrogen), total inorganic nitrogen (nitrate, nitrite, and ammonia nitrogen), total phosphate phosphorus, and orthophosphate phosphorus. Nutrient concentrations within the coastal lagoons exhibited strong seasonality, particularly with respect to wet and dry seasons (October to March and April to September, respectively). Average seasonal concentrations of total inorganic nitrogen, total nitrogen, orthophosphate phosphorus, and total phosphate phosphorus ranged from 0.47 to 0.65 mg/L, 1.3 to 1.8 mg/L, 0.09 to 0.1 mg/L, and 0.13 to 0.14 mg/L, respectively. These concentrations were generally similar to those in other brackish water lagoons within San Diego County.

2.8.3 Coastal Marine Waters

With exception of indicator bacteria as discussed below, measurements of water quality conditions in the ocean immediately adjacent to the mouth of the San Dieguito River have not been performed. Nevertheless, expected conditions can be characterized using data from other coastal areas within the general region.

2.8.3.1 Bacteria

The Pacific Shoreline near the San Dieguito River mouth was listed as a 303(d) water body impaired for indicator bacteria in 1998 and remains on the current 303(d) listing. Subsequent monitoring has demonstrated that the Pacific Ocean directly in front of the river mouth does not exceed the water quality standards for indicator bacteria. Coastal Environments performed bacteria sampling in the ocean directly in front of the river mouth from July 2002 through December 2003 while the river mouth was open and closed to the Pacific Ocean. The data demonstrates only one exceedance of indicator bacteria for enteroccocus (170 MPN/100ml November 2003). The site conditions were that the river mouth was open and there had been some recent rainfall. It is anticipated that the available data will be used to remove the river mouth from the Regional Water Quality Control Board's 303(d) list.

2.8.3.2 Temperature

The temperatures of nearshore waters are expected to vary seasonally from about 10 to 20ºC, generally with lower temperatures during winter and highest temperatures in late summer. These general seasonal patterns may be altered periodically by the effects of localized upwelling events. During summer, surface waters may reach temperatures several degrees warmer than those in near-bottom waters.

2.8.3.3 Salinity

The salinity of coastal waters is expected to range between 33 and 34 ppt, and values typically do not vary as dramatically as those in lagoon waters. Slightly higher salinity conditions accompany upwelling events, and lower salinity conditions occur, especially in surface waters, near the mouths of coastal rivers and lagoons following rainstorms. Otherwise, seasonal variations and depth-related differences in seawater salinity are expected to be minimal.

2.8.3.4 Dissolved Oxygen

Relatively greater variations in dissolved oxygen concentrations are expected to reflect depth distributions and seasonal cycles of photosynthetic organisms (phytoplankton), periodic upwelling events, and movement and mixing of different coastal water masses. Dissolved oxygen concentrations in nearshore waters of the Southern California Bight typically are within 5 to 10 mg/L, although slightly lower concentrations may occur in near-bottom waters following upwelling events.

2.8.3.5 Alkalinity/Acidity (pH)

The pH of seawater does not vary widely (i.e., more than a few tenths of a pH unit) due to its large buffering capacity. Typically, pH values are expected to be within a range of 7.9 to 8.2.

2.8.3.6 Water Clarity/Light Transmittance

The clarity of nearshore ocean waters will vary in response to river runoff, especially following storm events, the effects of sediment resuspension caused by wave action, and seasonal plankton blooms. In general, the clarity of seawater increases with greater distance from shore, as the effects of coastal runoff and wave action are reduced.

2.8.3.7 Nutrients

Nutrient concentrations in coastal waters of the Southern California Bight also vary seasonally in response to upwelling events, biological processes (uptake and regeneration), and the magnitude of inputs from runoff and river discharges. Typical nutrient concentrations in Southern California Bight waters are: nitrate — 5 to 200 nanomoles; phosphate — 0.1 to 0.5 micromoles; silicate — less than 5 micromoles; and ammonium 0.3 micromoles (Eganhouse and Venkatesan 1993).

3. SITE OPPORTUNITIES AND CONSTRAINTS

The opportunities and constraints that have significant influence on the wetlands restoration of the San Dieguito Lagoon are summarized in Table 3.1. The opportunities and constraints presented in Table 3.1 are similar to those presented in the Preliminary Restoration Plan submitted to the CCC in September 1997. This table is general in scope related to the overall project. Detailed mitigation measures for potential impacts associated with the project are provided in the FEIR/EIS.

Table 3.1. Site Opportunities And Constraints Related To Development Of The Final Restoration Plan (Final EIR/EIS 2000)

Category	Specific issue	Design consideration
OPPORTUNITIES		
Inlet characteristics	Past periods of opening of the inlet provide guidance of the inlet size and shape to maintain adequate tidal flushing.	The permittee funded substantial work examining the configuration and channel cross-sections during open and closed periods to understand inlet dynamics.
	Riverine flows can assist and maintain inlet opening.	The permittee has funded modeling work on riverine hydrodynamics to understand mechanisms of inlet opening and duration of opening as affected by storm flows.
	Beach is primarily sandy substrate	While some cobble exists below beach sand, it does not appear to limit maintenance operations that deal primarily with sand disposal. Sand disposal can be used for beach nourishment.
Water quality	Water quality under open conditions is sufficient to support marine resources.	The permittee funded pre-construction water quality surveys under closed and open conditions to determine baseline conditions, which demonstrated good water quality for marine organisms under open conditions excluding flood events. Coastal Commission staff have also conducted studies used in the evaluation of the benefits of maintaining an open inlet. These studies have allowed for the establishment of appropriate water quality criteria to relate to inlet opening.
	Soil contamination appears to be minimal.	The permittee funded pre-construction studies did not uncover significant soil contamination in sites to be excavated.
Biology	Existing wetlands provide seed source and habitat for wetland dependent animals.	Where possible, the permittee will utilize on-site materials to provide transplants for vegetation establishment and will preserve existing wetlands to encourage more rapid colonization of restored areas by wetland animals. FEIR/EIS requires that experimental transplantation efforts be undertaken for some sensitive plant species.

Table 3.1. Site Opportunities And Constraints Related To Development Of The Final Restoration Plan (Final EIR/EIS 2000)

Category	Specific issue	Design consideration
Biology (cont.)	Limited utilization by state or federally listed species allows for greater flexibility in wetland construction.	Only Belding's savannah sparrow and the California least tern currently utilize the site. While both species are located in areas that may be subject to construction, mitigation measures such as monitoring, buffer distances, and construction timing were developed in the EIR/EIS to address these impacts.
	Wildlife corridors and buffer zones around wetland.	Acquisition of open space by JPA and the location of San Dieguito provide additional migration corridors and transitional buffer zones around restoration areas.
Engineering	Access to construction and disposal sites.	Disposal site location and construction phasing will minimize environmental impacts.
CONSTRAINTS		
Flooding issues	Restoration plan may induce additional flood scour causing damage to infrastructure.	Traditional methods of flood damage control involve extensive armoring and bridge abutment stabilization. Revised designs employ "no net loss of transportable sediment" within Effective Flow Area (EFA). Berms have been designed to provide flow control under flood conditions as well as upland habitat, protection for nesting sites, and trail sighting.
	Flooding may induce additional sedimentation within the restoration site.	Berms provide additional protection to restoration basins to reduce siltation during major storms.
	Tidal prism is insufficient to maintain tidal exchange.	Significant excavation is planned to increase the tidal prism and a long-term inlet maintenance plan was developed.
Water quality	Lagoon closure results in decline of water quality.	The inlet maintenance plan includes monitoring of water quality and keeps inlet open for tidal flow.

Table 3.1. Site Opportunities And Constraints Related To Development Of The Final Restoration Plan (Final EIR/EIS 2000)

Category	Specific issue	Design consideration
Biology	Existing wetlands within footprint of restoration area will be impacted	Wetlands have been avoided wherever possible. When unavoidable, mitigation has been developed to replace lost resources.
	Nesting sites have impacts on existing seasonal wetlands	Nesting sites are an important habitat element for coastal wetland restoration and have been designed to minimize impacts to wetlands.
	Public trail system may have affect sensitive species.	The trail design has been carefully planned to avoid sensitive species that may use the site after restoration and sufficient buffers are provided in the overall plan.
Engineering	Excavated material is unsuitable for beach replenishment.	Disposal sites were identified to dispose of excavated material. Only material suitable for beach disposal will be used for beach replenishment.
	Numerous bridges and utilities cross restoration area.	Final engineering and design will assess the impacts to bridges and necessary protection measures will be incorporated .

4. RESTORATION PROJECT DESCRIPTION

4.1 INTRODUCTION/BACKGROUND

This restoration plan focuses on the restoration activities which are the subject of the current Coastal Development Permit request and a series of other permits being sought from local, State and Federal agencies. More specifically, the restoration activities are planned to accomplish the following goals:

- Satisfy wetland restoration requirements imposed on SCE by the SONGS CDP;
- Implement, and compensate for impacts associated with, the Coast to Crest Trail and related stormwater treatment pond proposed by the JPA;
- Accommodate nesting site construction imposed on 22nd Agricultural District by CCC; and
- Create wetland mitigation credits in an area to be known as The Villages Mitigation Bank located in the northern portion of the restoration area.

The restoration plan is a reflection of the Mixed Habitat Alternative addressed in the EIR/EIS. The restoration activities envisioned by the EIR/EIR are depicted in Figure 4.1a. This original restoration plan encompassed a number of restoration activities which were planned by the JPA in association with its development of its San Dieguito River Park Master Plan. As a result, Figure 4.1a shows a number of upland restoration activities (designated by the prefix "U"). In addition, it includes areas where additional restoration could be undertaken to offset conversion of wetlands to uplands in the course of restoration. These areas are identified by prefix "M".

As the JPA has insufficient funding at this time to do anything more than construct the trail and related facilities through the restoration area, the upland restoration elements and permanent nature interpretive center, identified in Figure 4.1a, are not included in this restoration plan. In addition, the following wetland areas shown on Figure 4.1a would not be planted at this time: W6a, W6b, W29, W30, W35 and W36. None of the upland habitat restoration areas (U18, U19, U22, U24, U25, U26, U27, and U28) are proposed at this time, as originally planned by the JPA; nor are the freshwater planting areas (FW20, FW21, FW23 and FW31). Lastly, the following mitigation sites shown on Figure 4.1a are not proposed to be used at this time: M32, M33, M34, M37 and M42. M41 (now referred to as TP41) is proposed to be used for stormwater treatment while M45 (now referred to as W45) is proposed to be used to offset permanent wetland impacts associated with restoration activities.

The restoration activities which are proposed to meet the requirements of the SONGS CDP and accommodate improvements planned by the JPA (e.g. Coast to Crest Trail and stormwater treatment) are illustrated in Figure 4.1b, as well as Figure 4.17, Figure 4.19 and Figure 4.20. The primary goal of the proposed restoration plan is to restore a significant portion of the site west and east of Interstate 5 (I-5) to tidal wetlands consisting of subtidal, intertidal mudflat, coastal salt marsh, and transitional wetland habitats created through excavation and grading of existing high elevation areas. To the west of I-5, a tidal basin will be created on the old airfield property (W1), San Diego's old sewage treatment ponds will be converted to coastal salt marsh and transitional wetlands (W2a and W2b), and the area immediately west of the San Diego property will be restored to coastal salt marsh (W3). On the east side of I-5, coastal salt marsh will be created north and south of the river (W4, W5, W10, and W16). ~~Transitional wetland~~Seasonal salt marsh habitat is created on W45 to offset the minor impacts of the project on existing wetlands. The Villages Mitigation Bank will be a 20.8-acre portion of the Restoration Project, consisting of tidal wetland habitats connecting to the remainder of the restoration site via a tidal channel. The Villages Mitigation Bank will also have a potential for credits related to enhancement of existing wetlands in addition to credits for creating wetlands.

A series of four connected freshwater runoff treatment ponds, occurring within Module TP41, will be installed on a 5-acre segment located immediately south of the Albertson's shopping center. These ponds will primarily be created to filter runoff while trapping and allowing for easy removal of invasive species. Through evaporation, the ponds will also reduce the flow of freshwater into the restored wetland.

Upland area will be used for disposal of soil excavated to create the tidal wetlands. These upland disposal sites are shown in Figure 4.1b as disposal sites DS32-DS36. DS32 would be used as the disposal area for the SONGS mitigation. In addition, the westerly portion of DS32 would be used to dispose of soil excavated in the process of creating the Villages Mitigation Bank. The SONGS portion of DS32 would be hydroseeded with naturalized and native vegetation. The slopes of the portion utilized for the Villages Mitigation Bank would be planted with a seed mix which would emulate coastal sage scrub. The flat portion would be hydroseeded in the same manner as the SONGS portion. All of disposal sites DS33 through DS36 would be hydroseeded with coastal sage scrub. In total, these hydroseeded disposal sites would create more than 50 acres of coastal sage scrub in the general area.

~~Excavated soil suitable for beach disposal (i.e., sand) will be placed on the local beaches (DS40).~~ S~~ome of the e~~uitable excavated soil will be used to create nesting sites (NS11 – NS14) for the California Least Tern and Western Snowy Plover and an existing nesting site (NS15) will be rehabilitated through removal of weeds and soil raking.

In the process of restoration, approximately ~~19~~ 27 acres of existing wetlands, primarily seasonal salt marsh, would be impacted either permanently or temporarily during construction. Some of these impacts are attributed to converting one type of wetland habitat to another as part of the restoration process. For example, excavating areas currently supporting seasonal salt marsh and restoring the area with subtidal or coastal salt marsh habitat. In other areas, existing wetlands would be permanently filled as a result of berm and nesting site construction. To compensate for the permanent losses, seasonal salt marsh is to be created within the overall project footprint. ~~The total amount of sand proposed for disposal (89,000 cy91,000 cy) is well below the capacity of Del Mar beach (250,000 cy).~~ Major components are as follows:

1. The total amount of sand proposed for disposal (91,000 cy) is well below the capacity of Del Mar beach (250,000 cy).

2. ~~1.~~ Initial and long-term periodic excavation of the tidal inlet to maintain marine water exchange between the ocean and the restored wetlands.

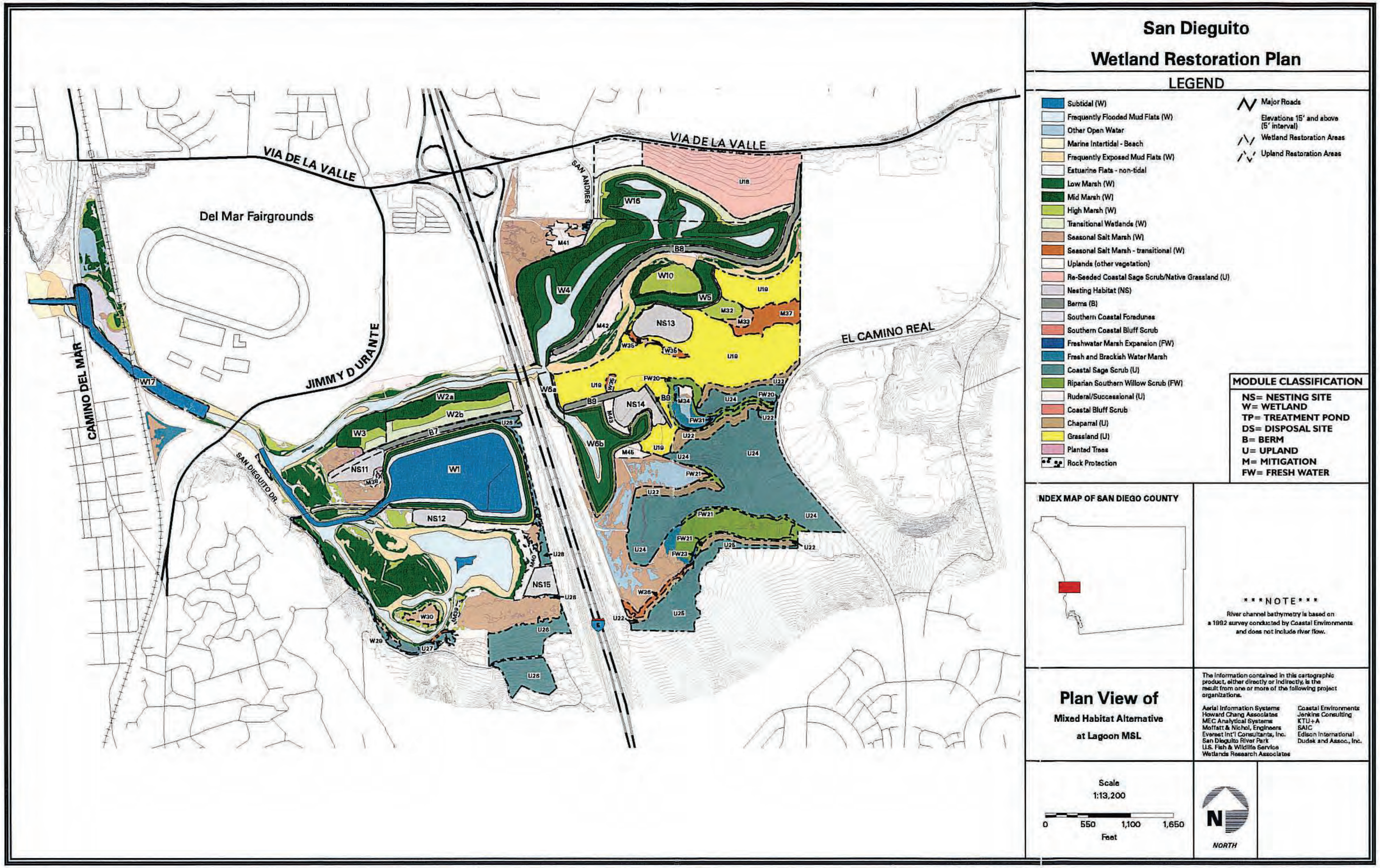


Figure 4.1a. San Dieguito Wetlands Restoration Project

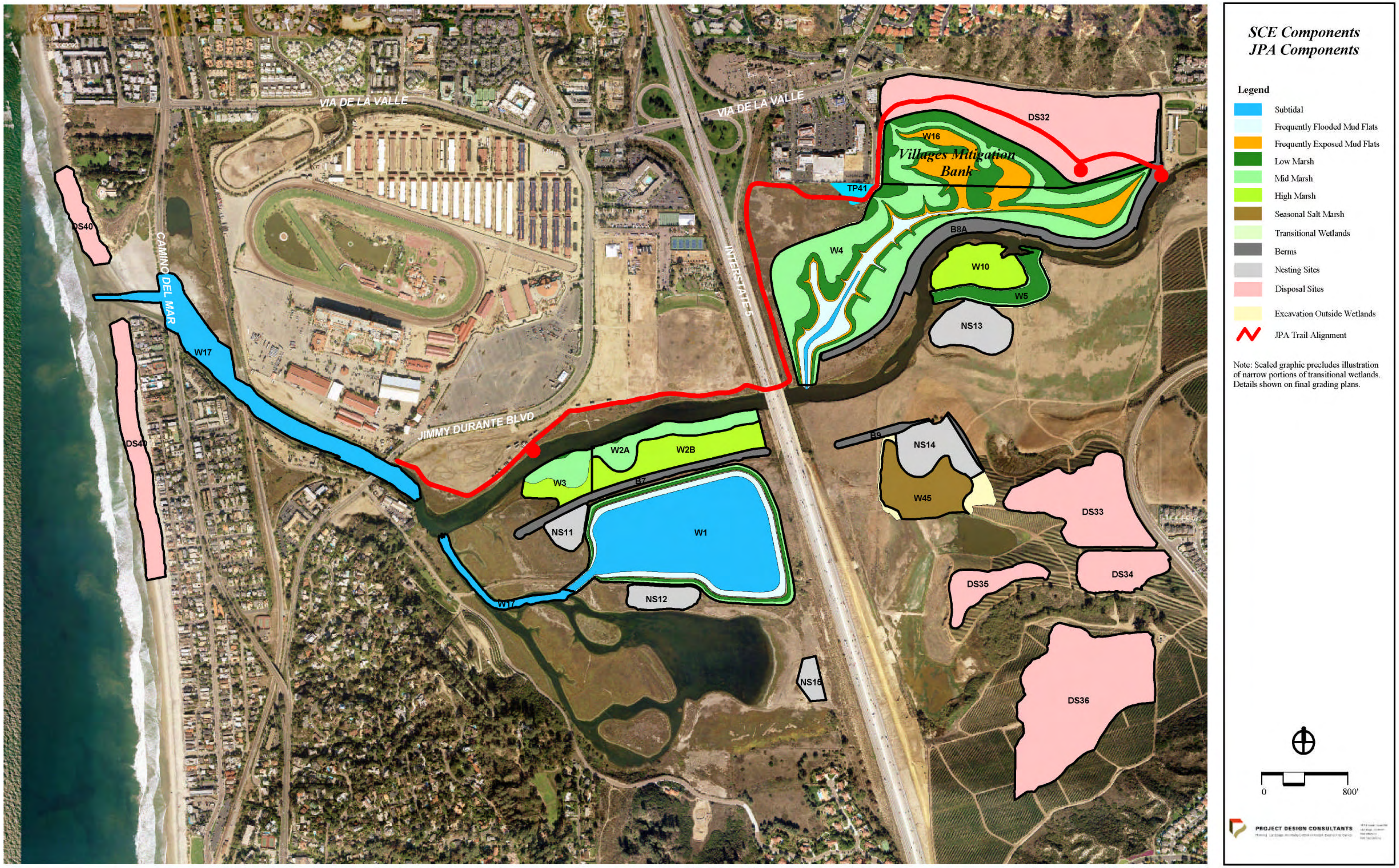


Figure 4.1b. San Dieguito Wetlands Restoration Project-SCE Components

~~2.~~3. Excavation and grading to create subtidal, intertidal, transitional, and seasonal salt marsh habitats east and west of Interstate 5.

~~3.~~4. Construction of three berms adjacent to the San Dieguito River to confine existing flood flows, protect restored habitat areas from extreme flood damage, and maintain the transport of river sediment to the ocean.

~~4.~~5. Select areas of stone slope protection for berms and shoreline areas.

~~5.~~6. A weir along the eastern edge of berm B8 to eliminate any backwater effect on the upstream river channel.

~~6.~~7. Improving beach access along the south side of the river inlet from Camino del Mar would provide access around the mouth of the lagoon during tidal~~y~~ exchange. The north access will include an ADA accessible ramp from Camino Del Mar leading to the beach area.~~A pedestrian trail along the south side of the inlet channel or alternative accessway that will provide access to Camino del Mar from the beach.~~

~~7.~~8. Creation of four nesting sites (NS11 – NS14) and rehabilitation of an existing nesting site (NS15) to provide habitat for the California Least Tern and Western Snowy Plover.

The responsibility for implementing the restoration plan lies primarily with SCE. The JPA is responsible for implementing and maintaining the Coast to Crest Trail components. Once the wetland restoration areas have become successfully established, SCE will convey the land supporting these habitats (with the exception of the Villages Mitigation Bank) to the JPA which would assume responsibility for long-term maintenance.

4.2 DETAILED DESCRIPTION OF PROJECT COMPONENTS

4.2.1 Tidal Wetland Habitat

Existing tidal wetland, seasonal wetlands, and upland areas will be excavated to create approximately ~~132.0~~ 163 acres of gross tidal wetlands. A relatively large portion of the floodplain will be excavated to create these coastal wetland habitats. Coastal wetland habitat includes subtidal, intertidal mudflats, coastal salt marsh (low, mid, and high), transitional wetland, and seasonal salt marsh habitat. The existing ground elevations typically range from +3 feet, NGVD to +12 feet, NGVD and the restoration project will involve excavation to elevations ranging from –6 feet, NGVD to +5 feet, NGVD.

The definition of the upper boundary for tidally influenced salt marsh varies depending on the method used to calculate this upper limit. Based on recent monitoring data collected at San Dieguito Lagoon, the CCC staff has estimated that the elevation break between high coastal salt marsh and transitional wetlands is approximately +4.5 feet, NGVD. However, modeling efforts by Jenkins and Wasyl (2000) have shown that areas as high as +4.7 feet, NGVD are inundated by high tides on an annual basis and research by Josselyn (2000) has indicated that high coastal salt marsh habitat has been found at an elevation as high as +8 feet, NGVD. Therefore, the area of habitat type creation was estimated by applying tidal inundation frequencies for existing habitat to the corresponding elevations of the restoration project that achieve those same inundation frequencies for all habitat types below high salt marsh. The elevation break between high coastal salt marsh and transitional non-tidally influenced salt marsh was based on the CCC definition of +4.5 feet, NGVD.

The restoration project will result in a net gain of approximately ~~138~~ ~~142.5~~127.47 ~~(this number includes the trail and treatment pond proposed mitigation)~~acres of wetlands.

Table 4.1 Summary of Wetland Habitat Impacted by Module – All Project Components(Based on CCC Wetland Delineation)

Habitats	Wetland habitat Area (Acres) Module No.																Total
	Temporary									*Permanent Impacts*							
	W1	W2A	W2B	W3	W4	W5	W10	W17	W45	B7	B8	DS32[6]	NS11[4]	NS12[4]	NS15	ROAD[5]	
Subtidal				0.02	0.04	0.08	0.17		0.02	0.00				0.01			**0.34**
Frequently Flooded Mudflats																	**0.00**
Frequently Exposed Mudflats																	**0.00**
Low Marsh																	**0.00**
Mid Marsh		0.25		0.14	0.03	0.16	1.55				0.10			0.17			**2.40**
High Marsh	0.07	0.04		0.29	0.06	0.28	0.12				0.14			1.72			**2.72**
Seasonal Salt Marsh	4.13	0.03	0.01	1.04	3.86	0.56	3.60	0.19	0.58	0.66	0.06		0.86			0.09	**15.67**
Estuarine Flats Non Tidal	0.08				0.02	0.10	0.01							0.13			**0.34**
Estuarine Flats Inter Tidal											0.01						**0.01**
Fresh and Brackish Water					0.44						0.02						**0.46**
Freshwater Marsh (nontidal)																	**0.00**
Riparian Southern Willow						0.01										0.002	**0.01**
Unadjusted Impact Totals	**4.28**	**0.32**	**0.01**	**1.49**	**4.45**	**1.19**	**5.45**	**0.19**	**0.60**	**0.66**	**0.33**	**0.00**	**0.86**	**2.03**	**0.00**	**0.090**	**21.95**
Adjusted Impact Totals [3, 4,6]	**4.28**	**0.32**	**0.01**	**1.49**	**4.45**	**1.19**	**5.45**	**0.19**	**0.60**	**2.64**	**1.32**	**0.00**	**0.00**	**0.00**	**0.00**	**0.36**	**22.30**
Habitat Created	**44.73**	**7.08**	**7.56**	**5.55**	**52.22**	**5.49**	**7.10**	**0.00**	**8.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**138.38**
Net Habitat Impacted/Created	**40.45**	**6.76**	**7.55**	**4.06**	**47.77**	**4.30**	**1.65**	**-0.19**	**8.05**	**-2.64**	**-1.32**	**0.00**	**0.00**	**0.00**	**0.00**	**-0.36**	**116.08**

[1] Villages project component.
[2] JPA project component. Trail impacts shown are the maximum expected and may decrease depending on the final alignment of the trail.
[3] 4:1 requirement for permanent impacts to B7, B8, NS15, and Road.
[4] Mitigation is not required for NS11 and NS12.
[5] Refer to "Wetland Delineation Report" for mitigation ratios associated with TP41 and Trail.
[6] Impacts from permanent maintenance road.
[7] 1:1 Requirement due to low quality and transitory nature of affected wetland.
*__Temporary impact subtotals:__ Unadjusted=28.5, Adjusted=28.59
*__Permanent impact subtotals__: Unadjusted=6.06, Adjusted=7.24

4.2.2 Wetland/Upland Transitional Habitat

Transitional habitat will be established on the berm slopes as well as other areas between high marsh and upland areas. The wetland/upland transitional habitat will consist of coastal wetland species near the base of the slopes. Farther up the slopes, a mixture of native grasses and coastal sage scrub species will develop that includes California buckwheat (*Eriogonum fasciculatum*), wild rye *(Leymus condensatus* and *L. triticoides*), western ragweed (*Ambrosia psilostachya*), California poppy (*Eschscholzia californica*), purple needlegrass (*Nasella pulchra*), coast goldenbush (*Isocoma menziesii*), black sage (*Salvia mellifera*), coyote brush (*B~~b~~accharis pilularu~~i~~s*), bladderpod (*Cleome isomeris*), coast sunflower (*Encelia californica*), and deerweed (*Lotus scoparius*). This transitional habitat will provide wildlife with diverse vegetation and natural cover at the edge of the restored wetland. Creation of this area will be carried out through a combination of grading, management of weeds and promotion of natural plants to colonize by seed. If planting is attempted, irrigation will most likely be needed. Soil amendments can also be added to this area. Management and maintenance of the transitional habitat areas will be very limited.

4.2.3 Upland Habitat

In order to establish suitable soils for native vegetation the project will place topsoil that was salvaged from the site in the upland areas that will be re-vegetated. It is likely, however, that this topsoil will contain a large number of weed seed. A native plant hydroseed mix will be applied to these upland areas. The hydroseed slurry will include soil-binding tackifier and site-specific plant mixes consisting of native species and erosion preventative vegetation, as determined by the permitting agencies. The project may utilize a combination of the following methods to reduce the initial establishment of weed seeds in these upland areas:

- Utilize irrigation water to germinate weed seeds and then disc the areas to destroy weeds. This process may be repeated several times prior to hydro-seeding the target species;
- Pre-treat the topsoil with a pre-emergent herbicide; and/or
- Implement a mowing program to reduce competition from weed species and cut off weed seeds before they are viable.

Given the large scale of the project, we will select a method based on effectiveness and feasibility of implementation.

4.2.4 Nesting Sites

The restoration project includes the construction of four nesting sites and rehabilitation of an existing site that is now covered with weedy species. This aspect of the project was related to a request to SCE from Coastal Commission to accommodate mitigation it had previously required of the 22nd Agricultural District for wetland impacts associated with expansion of parking facilities associated with the Fairgrounds. In exchange for wetland impacts related to parking lot expansion, the CCC is seeking the creation of the new nesting areas and the rehabilitation of an existing nesting area for sensitive birds in the restoration area. It should be noted, however, that SCE was not obligated to maintain and monitor the mitigation sites nor was it required to compensate for any wetland impacts associated with construction of these nesting areas.

The locations of the five nesting sites (NS11, NS12, NS13, NS14, and NS15) are illustrated in Figure 4.1b (shown in gray). The five sites will provide ~~14.4~~12.3 acres of flat nesting area for the California least tern, western snowy plover, and other shorebirds. The nesting sites will be somewhat higher than the surrounding wetlands in order to protect the sites from tidal inundation, resulting in the creation of gentle side slopes and a nesting plateau that is smaller in acreage than the base of the nesting site. A total footprint of approximately ~~19.3~~20.5 acres will be required to provide adequate distance for side slopes. The base (footprint) and nesting plateau areas of the nesting sites are provided in Table 4.2.

Table 4.2. Nesting Site Summary

Site Name	Module No.	Property Owner	Area[1] (acres)	Fill Volume[2] (yd^3)	Sand Volume (yd^3)
Nesting Site 11	NS11	JPA	2.0/2.6	~~12,500~~7,100	~~8,100~~10,500
Nesting Site 12	NS12	JPA	1.4/3.2	~~5,500~~6,100	~~9,500~~9,300
Nesting Site 13	NS13	SCE & City	5.4/6.4		~~18,500~~10,500
Nesting Site 14	NS14	JPA	2.5/6.6	~~11,100~~5,700	~~11,800~~14,300
Nesting Site 15	NS15	CDFG	~~2.6~~1.0/~~3.1~~1.7	4,600	~~7,600~~5,400
Total			**~~13.9~~12.3/2~~1.9~~0.5**	**~~29,100~~23,500**	**~~55,500~~50,000**

Notes: 1. Top area of grade break/footprint area at existing elevation.
2. Based on 15% Shrinkage Recommendation Contained In "Geotechnical Investigation: Material Characterization And Disposal, San Dieguito Lagoon Restoration, Del Mar, California." M&T Agra, Inc. October 22, 1993

The location and size of the four created nesting sites was determined through consultation with the USFWS, CDFG, and CCC. Site selection considered the ability to provide a minimum of 1.9 acres of usable nesting area per site, achieve an open panorama from the site, and establish adequate setbacks from high structures. It was determined that the creation of numerous small sites was more beneficial to nesting birds than few large sites.

The base of nesting sites will be constructed using soil excavated from other restored areas. T~~T~~he target heights of the nesting plateaus ~~is~~ would vary from ~~approximately~~ +10 feet, NGVD at NS11 and NS12; +12 feet, NGVD at NS13; +15 feet, NGVD at NS15; and +19~~.~~ feet NGVD at NS14. ~~-~~ The quantity of the base soil needed will depend on the starting elevation for each site. Excavated soil used for the nesting site bases will be dried and compacted to 85 percent relative density. Once the bases are properly compacted, ~~two~~ three feet of coarse white or light colored sand will be placed on top. The footprint of NS15 has been designed to avoid impacts to existing wetland habitat.

Sand excavated ~~removed~~ from the former naval airfield site ~~inlet channel~~ during initial grading ~~may~~ will be used as nesting site surface material and has been ~~pending~~ approved~~al~~

by the resource agencies as to its suitability. In order to optimize the attraction of terns to these sites, scattered shell fragments will be added to the sand cap. The recommended mixture of 80 percent coarse sand and 20 percent shell fragments will be used to create the nesting sites (personal communication, Fancher 1999). Under no circumstances will the silt/clay proportion be greater than 15 percent or the sand proportion less than 85 percent. Surface material will be free of viable weed seeds, organic matter and dark material. The base material will be placed, dewatered, and compacted so that subsidence over five years will not result in nesting plateau elevations below +10 feet, NGVD. If cracking occurs during drying, the base material will be regraded to eliminate surface crevices.

The nesting sites will consist of a nearly flat central nesting plateau with side slopes descending to the marsh plain. Nesting site NS12 may provide the only suitable habitat for snowy plovers since the chicks require a broad unvegetated intertidal flat nearby for foraging. Base material will be placed and contoured to prevent accumulation of water on the surface that may encourage the growth of vegetation. The side slopes of NS12 and NS13 will be graded at a 10:1 gradient starting at the edge of the nesting site plateau. Nesting sites NS11 and NS14 will be incorporated into adjoining berms and will have a maximum slope of 3:1 along the berm side of the nesting plateau. Therefore, it may be necessary to install chick fences along the tops of this slope. Grading will be conducted in a manner that will minimize the formation of rivulets that may increase erosion of the slopes. The grading for the five nesting sites is presented in Figure 4.2.

The primary construction activity for the nesting sites will be the movement of excavated base soil and capping sand to the specified locations. This method of construction will require either a dredge or excavator to physically transport the material. Land based construction equipment will be required to move and grade the fill material. For some species, such as the western snowy plover, the chicks must have unimpeded access to the waters edge for foraging so it is important for these areas to remain unvegetated. Therefore, the side slopes of the nesting sites adjoining open water areas will be graded with a ~~3~~ 10:1 slope to allow easy access to the waters edge and also avoid erosion. However, for other side slopes, which do not border open water areas, revegetation may be proposed if side slopes are partially prone to erosion.

NS13 and NS14 are located adjacent to upland areas, creating a potential for mortality from ground-based predators. To reduce or eliminate this source of mortality, a chain link fence will be installed around the base of these two sites to exclude ground-based predators.

Fence posts will be placed 10 feet apart on center. Polyethylene netting will be attached on the lower 4 feet of the chain-link fence as appropriate. The chain-link fence will be buried one foot below ground level for a finished height of 7 feet above ground surface. Surface material will extend at least 5 feet from the bottom of the fence on both sides. Each site that is fenced will have an access gate large enough in width to allow construction maintenance equipment to enter. If permanent access features (e.g., roads) are required for nesting site maintenance then this issue needs to be discussed in more detail between SCE, JPA, USFWS, and CCC staff.

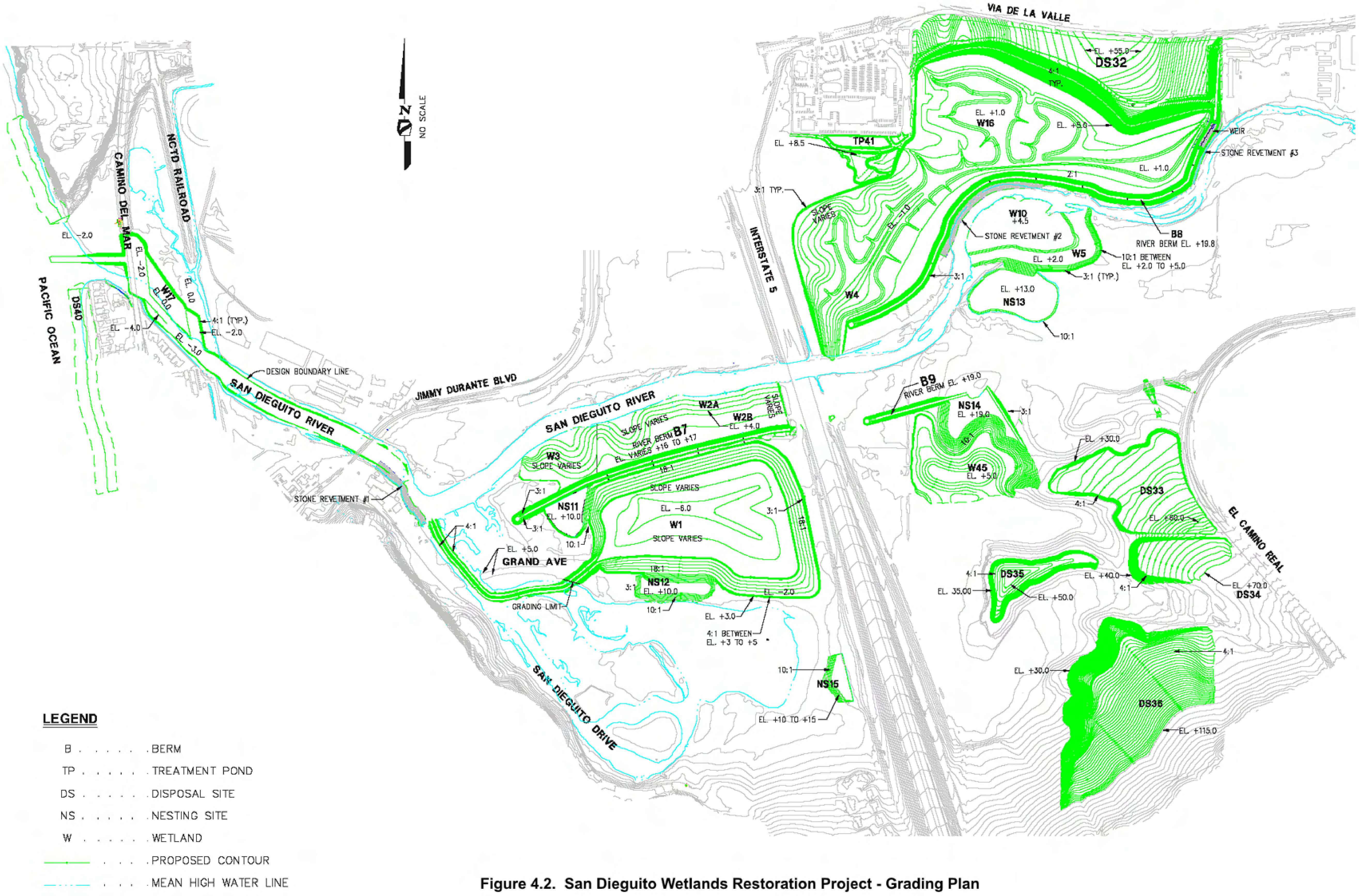


Figure 4.2. San Dieguito Wetlands Restoration Project - Grading Plan

4.2.5 Excavation and Grading

The tidal wetland restoration component of the restoration project will involve excavation and grading across ~~217.4~~223.7 acres of tidal and non-tidal wetlands, berms, and nesting sites. ~~and upland areas~~ (~~321~~331~~328.3~~ acres including upland and beach disposal sites). Excavation will result in about ~~2,008,500~~2,083,500 cubic yards, including a two-foot overdredge allowance in W1 and W17. Table 4.3 presents a breakdown of the proposed construction sites, owner of record, acreage, and proposed excavation and fill volumes. Of the total volume of excavated soil, about ~~164,500~~114,500 cubic yards will be used for features within the project, including ~~135,300~~91,000 cubic yards for berm construction and ~~29,100~~23,500 cubic yards for creating the bases of the nesting sites.

The restoration project will result in the excavation of eight modules (W1, W2a, W2b, W3, W4, W5, W10, W45, and W17) to create the subtidal, intertidal, and salt marsh habitats. W16 will be excavated as part of the construction, but is not required for the SONGS mitigation. It will be operated as the Villages Mitigation Bank by SCE. To provide the hydraulic regime necessary to support these habitat areas, additional excavation will be done at the river mouth and within the inlet channel to provide ocean water exchange. In total, the restoration project will generate approximately 1,919,000~~2,094,000~~ cubic yards of excavated soil for disposal. The grading for each construction module is described below and illustrated in Figure 4.2.

In addition to the excavation at the river mouth and in the inlet channel, there are five major areas of excavation proposed on the west side of I-5. Area W1, referred to as the western tidal basin or old airfield property, consists of approximately ~~49.4~~45.8 acres and will be excavated to a maximum depth of -6 feet, NGVD. The slopes of the basin will extend from +10~~3~~ feet NGVD to -6~~2~~ feet NGVD with varying~~a~~ gradients. ~~of 18 (horizontal) to 1 (vertical) (18:1)~~.

Area W2a (6.2 acres) will be excavated to an elevation below +3.8 feet NGVD in order to create appropriate conditions for the restoration of mid salt marsh. Area W3 (5.~~6~~5 acres) will be excavated to an elevation ranging from +2.2 to +4.5 feet NGVD in order to achieve the appropriate elevations for mid and high salt marsh. A band of transitional wetland also will be created along the southern edge of Area W3. The slope will vary with the intent of having these areas drain north toward the river.

Area W2b (8.~~4~~5 acres) will be excavated to an elevation range of +3.8 to +4.5 feet NGVD to support high salt marsh along the northern edge of the site and transitional wetland along the southern edge of the site.

East of I-5, Areas W4 (5~~1.3~~2.9 acres) and W16 (21.~~3~~1 acres) will be graded as one unit to create a combination of salt marsh habitats. These areas will be excavated to a maximum depth of –1.0 foot, NGVD, with much of the excavated area outside of the finger channels at elevation +3 feet, NGVD. The existing elevation of Area W10 will be lowered to +4.5 feet, NGVD in order to support high marsh habitat. Area W5 will be excavated to +2.2 feet, NGVD to support a low marsh habitat channel.

~~Table 4.2. Excavation and Fill Summary~~

~~Site Name~~	~~Module No.~~	~~Property Owner~~	~~Module Area (acres)~~	~~Neat Line Volume (yd^3)~~	~~Overdredge Volume[1] Cut (yd^3)~~	~~Fill Volume[2] (yd^3)~~	~~Sand Fill Volume[3] (yd^3)~~
~~Subtidal Lagoon/Intertidal Salt Marsh~~	~~W1~~	~~JPA~~	~~45.8~~	~~689,300~~	~~98,200~~		
~~Intertidal Salt Marsh~~	~~W2a~~	~~City~~	~~6.2~~	~~41,000~~			
~~Intertidal Salt Marsh~~	~~W2b~~	~~City~~	~~8.5~~	~~39,500~~			
~~Intertidal Salt Marsh~~	~~W3~~	~~JPA~~	~~5.5~~	~~20,000~~			
~~Intertidal Salt Marsh~~	~~W4~~	~~SCE & JPA~~	~~52.9~~	~~680,000~~			
~~Intertidal Salt Marsh~~	~~W5~~	~~SCE & JPA~~	~~5.5~~	~~56,000~~			
~~Intertidal Salt Marsh~~	~~W6a~~	~~City~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
~~Intertidal Salt Marsh~~	~~W6b~~	~~DAA~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
~~River Berm No. 1~~	~~B7~~	~~JPA~~	~~4.2~~			~~39,000~~	
~~River Berm No. 2~~	~~B8~~	~~SCE & JPA~~	~~9.0~~			~~66,000~~	
~~River Berm No. 3~~	~~B9~~	~~City & JPA~~	~~1.8~~			~~16,000~~	
~~Intertidal Salt Marsh~~	~~W10~~	~~SCE & JPA~~	~~6.7~~	~~33,000~~			
~~Nesting Site No. NS 11[4]~~	~~NS11~~	~~JPA~~	~~2.0/2.6~~			~~12,500~~	~~8,100~~
~~Nesting Site No. NS 12[4]~~	~~NS12~~	~~JPA~~	~~1.4/3.2~~	~~—~~	~~—~~	~~5,500~~	~~9,500~~
~~Nesting Site No. NS 13[4]~~	~~NS13~~	~~SCE & City~~	~~5.4/6.4~~				~~18,500~~
~~Nesting Site No. NS 14[4]~~	~~NS14~~	~~JPA~~	~~2.5/6.6~~			~~11,100~~	~~11,800~~
~~Nesting Site No. NS 15[4]~~	~~NS15~~	~~CDFG~~	~~2.0/3.1~~				~~7,600~~
~~Intertidal Salt Marsh~~	~~W16~~	~~SCE~~	~~21.1~~	~~272,300~~			
~~Inlet channel/ Channel to Lagoon~~	~~W17~~	~~DAA~~	~~18.6~~	~~66,600~~	~~22,500~~		
~~Treatment Ponds~~	~~TP41 (M41)~~	~~JPA~~	~~4.6~~	~~7,500~~			
~~Mitigation Site~~	~~M42~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~
~~Mitigation Site~~	~~W45 (M45)~~	~~SCE~~	~~11.0~~	~~5,500~~			
~~**Total**~~			~~**214.7/223.3**~~	~~**1,910,700**~~	~~**120,700**~~	~~**150,100**~~	~~**55,500**~~

~~1. Assume two-foot overdredge over W1 and W17.~~
~~2. Based on 15% shrinkage recommendation contained in "Geotechnical Investigation: Material Characterization and Disposal, San Dieguito Lagoon~~
~~3. Restoration, Del Mar, California," M&T Agra, Inc., October 22, 1993.~~
~~4. Sand imported from offsite unless geotechnical investigation determines suitable on-site material is available.~~
~~5. Top area at grade break/footprint area at existing elevation.~~

Table 4. 3.Excavation and Fill Summary

Site Name	Module No.	Property Owner	Module Area (acres)	Neat Line Volume[5] (yd^3)	Overdredge Volume[1] Cut (yd^3)	Fill Volume[2] (yd^3)	Sand Fill Volume[3] (yd^3)
Subtidal Lagoon/Intertidal Salt Marsh	W1	JPA	45.8	689,300	98,200		
Intertidal Salt Marsh	W2a	City	6.2	46,900			
Intertidal Salt Marsh	W2b	City	8.5	39,600			
Intertidal Salt Marsh	W3	JPA	5.5	20,100			
Intertidal Salt Marsh	W4	SCE & JPA	52.9	681,100			
Intertidal Salt Marsh	W5	SCE & JPA	5.9	56,300			
Intertidal Salt Marsh	W6a	City	N/A	N/A	N/A	N/A	N/A
Intertidal Salt Marsh	W6b	DAA	N/A	N/A	N/A	N/A	N/A
River Berm No. 1	B7	JPA	4.2			33,000	
River Berm No. 2	B8	SCE & JPA	10.0			42,000[6]	
River Berm No. 3	B9	City & JPA	1.8			16,000	
Intertidal Salt Marsh	W10	SCE & JPA	7.1	37,000			
Nesting Site No. NS 11[4]	NS11	JPA	2.0/2.6			7,100	10,500
Nesting Site No. NS 12[4]	NS12	JPA	1.4/3.2	__	__	6,100	9,300
Nesting Site No. NS 13[4]	NS13	SCE & City	5.4/6.4			0	10,500
Nesting Site No. NS 14[4]	NS14	JPA	2.5/6.6			5,700	14,300
Nesting Site No. NS 15[4]	NS15	CDFG	1.0/1.7			4,600	5,400
Intertidal Salt Marsh	W16	SCE	21.1	270,000			
Inlet channel/ Channel to Lagoon	W17	DAA	18.6	51,000	40,000		
Treatment Ponds	TP41 (M41)	JPA	4.6	4,000			
Mitigation Site	M42	N/A	N/A	N/A	N/A	N/A	N/A
Mitigation Site	W45 (M45)	SCE	11.0	50,000			
Total			**215.5/223.7**	**1,945,300**	**138,200**	**114,500**	**50,000**

1. Assume two-foot overdredge over W1 and W17.
2. Quantities have incorporated an 18% shrinkage factor for berms and a 10% shrinkage factor for nesting sites based on recommendation contained in "Geotechnical Investigation, San Dieguito Wetlands Restoration and Park Pathway Project, San Diego and Del Mar, California" Ninyo & Moore dated July 22, 2004.
3. On site sand material has been determined as suitable for the nesting sites.
4. Top area at grade break/footprint area at existing elevation.
5. Overexcavations for clay amendments to the wetlands have been accounted for in the quantities.
6. Volume does not include imported clay and rip rap for berm protection.

Additional grading will be done on modules TP41 (formerly known as M41) and W~~-~~45 (formerly known as M45). W~~-~~45 will be lowered to +4.7 feet, NGVD and TP41 will be at elevation +8.5 feet, NGVD.

Module TP41 will consist of ~~stormwater treatment ponds~~freshwater runoff treatment ponds which will be installed just south of the present shopping center area to trap and allow for easy removal of invasive species. These ponds, located off the river channel, will be constructed predominantly through the natural drainage course. High flows will be returned directly to the existing drainage course by flowing over the weir in the first basin. The low flows, which are the most polluted, will pass consecutively through the other three basins in series before returning to the natural drainage course. The trail segment in this area will be raised above the water table, and flows coming from the north will be directed underneath. Module TP41 is also described further in Section 4.6.

Module W45 will be located immediately south of ~~Nesting Site~~ NS14. This area will be comprised of seasonal salt marsh. The original footprint of W45 has been enlarged and will now cover approximately 11 acres in order to provide non-tidal wetlands to offset additional temporary and permanent impacts associated with restoration activities. ~~T~~

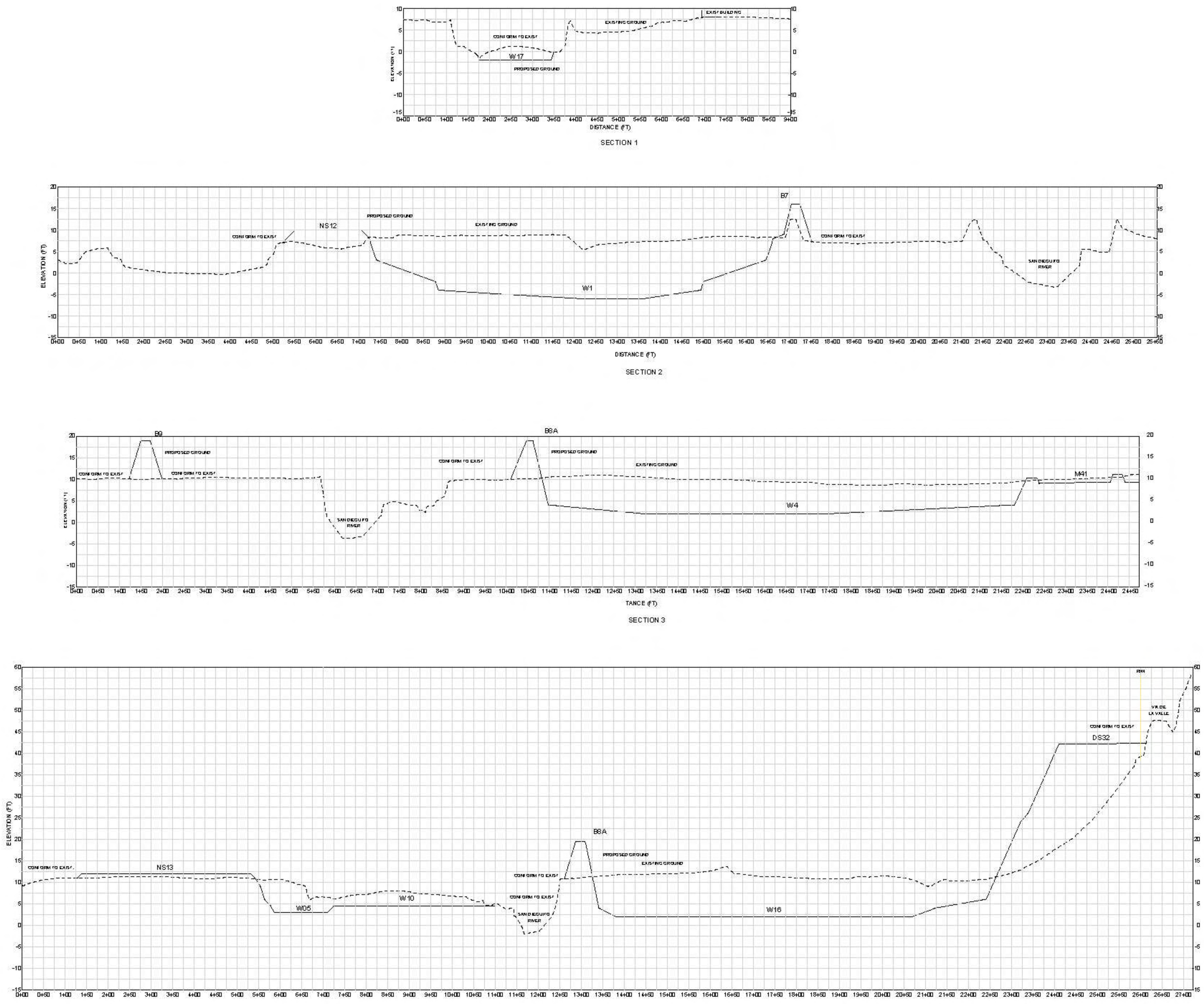
In addition to excavating the site to restore coastal wetlands, grading also will be required to construct the nesting sites and river berms. Fill and grading will be required to restore the upland areas indicated in Figure 4.2. Figure 4.3 presents a series of cross-sections that illustrate the topographical changes that will occur throughout the site as a result of the restoration project.

Secondary grading features beneficial to wetlands restoration success (i.e., tidal sloughs, grading heterogeneity) have been included in the restoration. In consultation with CCC scientists, microchannels have been incorporated into the final grading plan to provide a more natural condition.

Soil amendments will be added to soils in the high marsh and seasonal salt marsh habitat areas. The goal is to make soils similar to natural occurring wetland soils in the region. Specifically, the project will examine the feasibility of increasing the clay content and organic matter content of the wetland topsoil in these areas. The project will attempt to utilize, and may be limited by the availability of, on-site resources such as existing topsoil and clay soils to accomplish this goal.

4.2.6 Tidal Inlet Excavation

Historical observations of the San Dieguito Lagoon and the results of monitoring conducted by Coastal Environments (1998) from 1992 to 1994 demonstrate that beach sand influx into the lagoon causes intermittent closure of the mouth to tidal influence. Once this occurs, water quality in the lagoon begins to deteriorate. Restoration of the lagoon would increase the tidal prism and self-scouring capabilities of the inlet, somewhat reducing the closure frequency. However, recent studies by Jenkins and Wasyl (1998) and Goodwin and Florsheim (1997) indicate that periodic dredging/excavation would be needed to maintain an open lagoon despite the increased tidal prism. Therefore, the restoration project involves initial grading at the river mouth and in the inlet channel. Elwany et al. (1994) analyzed the dynamics of the lagoon openings and closings from 1992 to 1994. Based on the monitoring



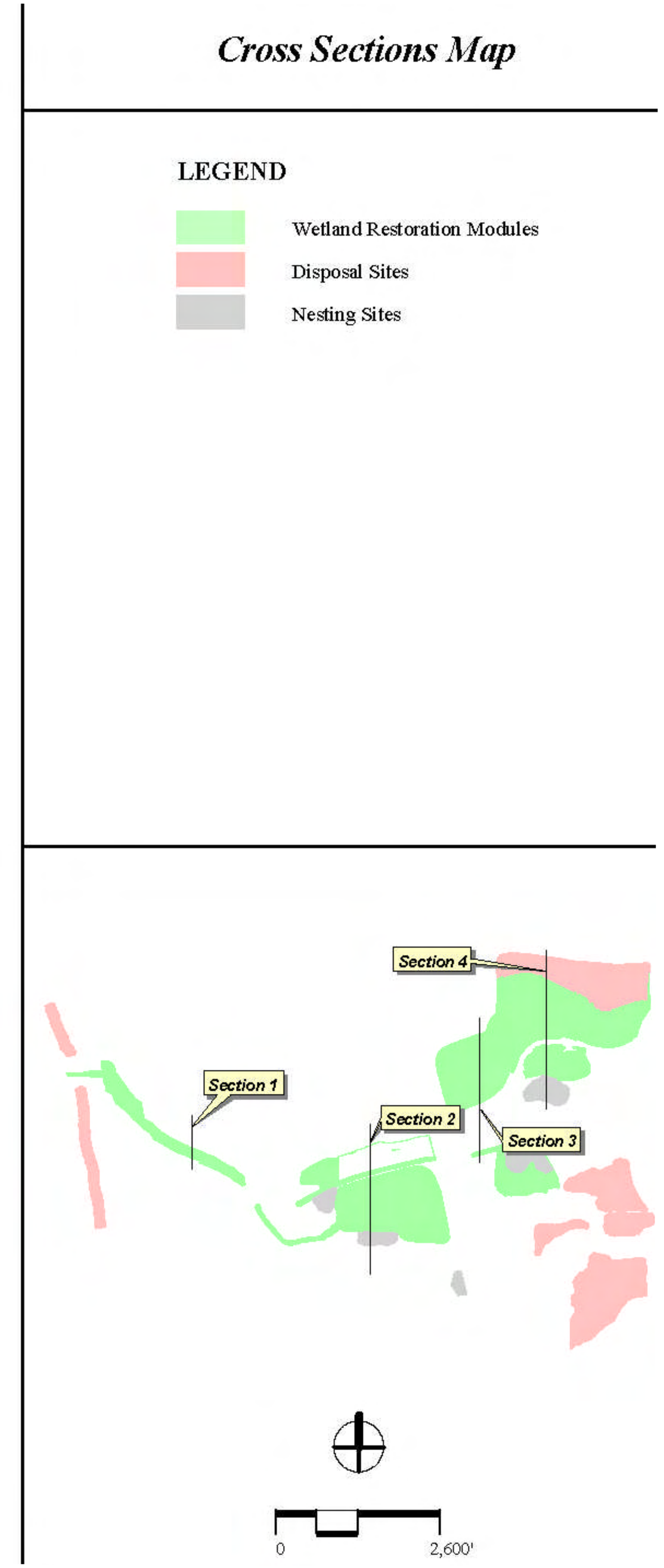


Figure 4.3. San Dieguito Wetlands Restoration Project-Typical Sections

information, historical observations from San Dieguito Lagoon, and comparative data from other lagoons in Southern California, the rationale for the initial grading and long-term inlet maintenance plans were developed as follows.

The initial excavation of the tidal inlet channel will create a channel 900 feet long between the ocean and North County Transit District (NCTD) railroad bridge as illustrated in Figure 4.4. This grading will be necessary only if the channel conditions at the time of project implementation are not consistent with the initial design specifications indicated in Figure 4.4. The depth of the river channel currently varies depending on up- and downstream conditions. The channel may be deeper following a stormy period and much shallower following long periods of inlet closure. The depth of the channel at a point approximately 450 feet east of the Jimmy Durante Bridge was measured at –15 feet NGVD on January 14, 2004. Under these conditions, no additional grading would be required in this area to achieve the initial design specifications. The channel could be deeper or shallower at the time project construction begins.

The initial inlet dredging shall be as shown on the approved drawings. At the time the inlet is dredged for the initial opening, any beach depressions from the pre-existing inlet channel shall be filled to a level approximating the adjacent undisturbed beach levels. Should the location of the inlet be different than the initial location during subsequent maintenance, dredging may occur along the new alignment provided the new alignment occurs no closer than 40 feet north of the rip rap along the south edge of the mouth of the lagoon. If the new alignment occurs within 40 feet of this rip rap and the inlet is open at the time of the dredging, the maintenance shall widen the inlet on the north side of the existing channel. If the new alignment occurs within 40 feet of this rip rap and the inlet is closed at the time of the dredging, the maintenance shall create an inlet channel which is more than 40 feet from the rip rap and fill any remnants of the old channel within 40 feet of the riprap bank to the south. The first priority for disposal of suitable dredged material shall be restoration of the beach on either side of the lagoon mouth.

All suitable beach sand materials dredged west of the Jimmy Durante Bridge shall be placed in the pre-existing inlet channels and on the adjacent Del Mar beach during the initial inlet dredging, except, if it is determined by all applicable resource agencies that the sand is needed for least tern nesting site construction, or if the "airfield" sand volume is inadequate for the least tern nesting sites, SCE may include in the Dredging and Disposal Plan the use of sand dredged from the area west of Jimmy Durante Boulevard to renourish the least tern nesting sites.

Beach sand materials dredged from all subsequent inlet maintenance openings shall be placed directly on the Del Mar beach.

After initial grading the inlet channel dimensions west of the Highway 101 Bridge will be self-equilibrating according to tidal stage and sea level elevations. For mean tidal ranges in dry weather, the bottom elevation of the inlet channel will rise from -2.0 feet, NGVD under the Highway 101 Bridge to an inlet sill elevation of -0.9 feet, NGVD near the berm of the beach. The channel width will vary between 60 feet and 130 feet west of the Highway 101 Bridge depending on tide conditions (i.e., spring or neap). At low tides the inlet channel across the beach will be dry because the ocean water elevation is lower than the inlet sill elevation. However, when the river floods during wet weather, the inlet channel will be scoured considerably deeper and wider than these dimensions and will be continuously inundated. The later is a pre-project condition, which will not be affected by the project.

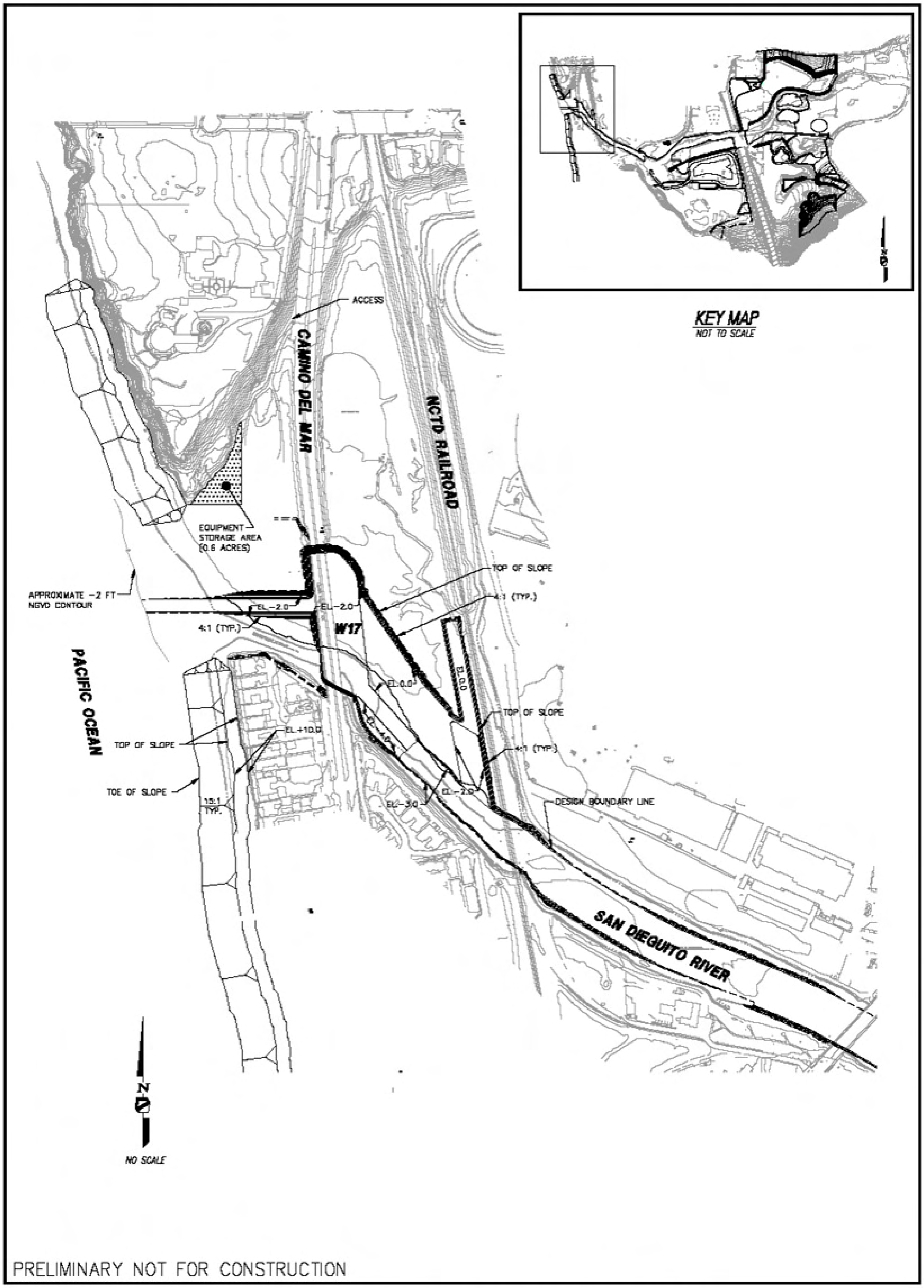


Figure 4.4. Tidal Inlet Channel - Initial Grading Plan

In the area between Highway 101 and the railroad bridge, the required depths should range from 0.0 feet, NGVD to –4.0 feet, NGVD with depths of –2.0 feet, NGVD and –3.0 feet, NGVD at the southern end of the railroad bridge. It is anticipated that storm flows will scour the channel between the NCTD Bridge and Jimmy Durante Bridge to an elevation of about –3.0 feet, NGVD. However, if the channel dimensions do not meet these requirements at the time of project construction then the area will be excavated to achieve the desired widths and depths. The width will range from about 500 feet just east of the Highway 101 Bridge to 250 feet in width about 400 feet east of the Highway 101 Bridge. The channel will be graded with side slopes of 4:1.

This initial grading operation will impact up to ~~16.7~~1.5 acres of the rivermouth area. It is estimated that approximately ~~89,100~~91,000 cubic yards of sand will be excavated from the channel; however, the actual volume of sand removed will depend upon the existing elevations in the channel at the time of project implementation. The excavated material is expected to be clean sand. ~~About 55,500 cubic yards of sand will be needed as surface material for the proposed nesting sites. Therefore, if the nesting sites are constructed prior to channel excavation, the sand removed from the tidal inlet channel will be used to complete the nesting sites. Any sand not used for the nesting sites will be placed on the beach about 0.5 miles south of the inlet.~~ Based on preliminary geotechnical investigations, encountering volumes of sand suitable for beach disposal ~~or nesting site construction~~ is not expected east of the Jimmy Durante Boulevard Bridge. Although isolated pockets of suitable sandy material might be encountered during construction, it probably would not be cost-effective to separate the material from the remaining soil.

4.2.7 Disposal Sites

The ~~2,094,600~~1,828,000 cubic yards of excavated soil not used for river berm and nesting site base construction will be placed at the six upland disposal sites (DS32 – DS36) and beach disposal site (DS40) shown in Figure 4.5. The capacity and usage of the disposal sites is provided in Table 4.~~3~~4.

Per SCE's November 16, 1998 MOA with the JPA and City of San Diego, SCE will place only non-expansive soil on the 6-acre sub-area within DS32 proposed for construction of the JPA Nature Center. Soil placed on the Nature Center site will be compacted to 90% relative density.

4.2.8 Berms

River berms will be constructed along the river channel to maintain flow velocity and river sediment flow through the lower valley consistent with existing conditions (Chang 1997). The primary intent of the berms will be to maintain the existing rate of channel scour from El Camino Real to the Pacific Ocean and in no way alter the existing patterns of stormwater flooding. Three river berms have been incorporated into the restoration plan. The westernmost berm (B7) will be located west of I-5 and south of the San Dieguito River. It will run in a slightly southwesterly direction from I-5 for approximately 1,825 feet. The top of the berm will vary in elevation from +16.5 feet, NGVD to +17.5 feet, NGVD with a footprint of approximately 4.~~4~~ 2acres. Its purpose is to keep high velocity river flows from entering the tidal basin (Area W1) and resulting in sedimentation.

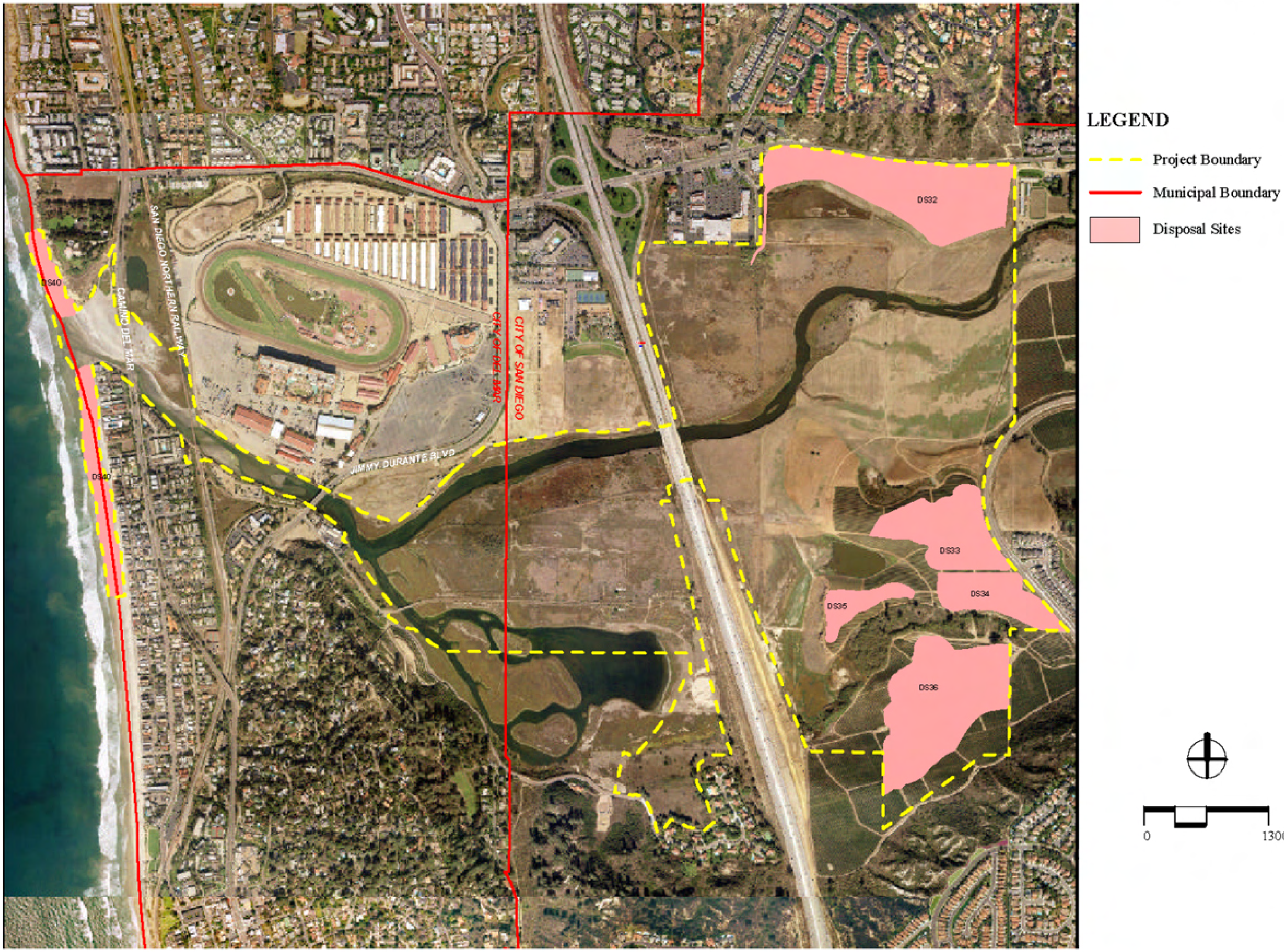


Figure 4.5. Disposal Site Locations

Table 4.~~3~~4. Disposal Site Summary

Disposal Site Number	Disposal Site Name	Module Area (acres)	Capacity Volume (yd^3)	Disposal Volume (yd^3)[1]
DS32	Villages Parcel	32.7	927,000	913,000
DS33	El Camino Real North	16.4	121,000	121,000
DS34	El Camino Real Southeast	6.6	47,000	47,000
DS35	El Camino Real Southwest	5.2	70,000	70,000
DS36	Ranches Parcel	30.3	703,000	677,000
DS40	Del Mar Beach	16.1	250,000	91,000
Totals		**107.3**	**2,118,000**	**1,919,000**

1. Quantities have incorporated an 18% shrinkage factor for DS32 and a 10% shrinkage factor for the remaining disposal sites based on recommendation contained in "Geotechnical Investigation, San Dieguito Wetlands Restoration and Park Pathway Project, San Diego and Del Mar, California" Ninyo & Moore dated July 22, 2004.

~~Table 4.3. Disposal Site Summary~~

~~Disposal Site Number~~	~~Disposal Site Name~~	~~Module Area (acres)~~	~~Capacity Volume (yd^3)~~	~~Disposal Volume (yd^3)[1]~~
~~DS32~~	~~Villages Parcel~~	~~32.7~~	~~928,000~~	~~928,000~~
~~DS33~~	~~El Camino Real North~~	~~14.2~~	~~98,000~~	~~98,000~~
~~DS34~~	~~El Camino Real Southeast~~	~~9.5~~	~~164,000~~	~~164,000~~
~~DS35~~	~~El Camino Real Southwest~~	~~3.9~~	~~57,000~~	~~57,000~~
~~DS36~~	~~Ranches Parcel~~	~~27.5~~	~~758,000~~	~~758,000~~
~~DS40~~	~~Del Mar Beach~~	~~16.1~~	~~250,000~~	~~89,000~~
~~**Totals**~~		~~**103.9**~~	~~**2,255,000**~~	~~**2,094,600**~~

A second berm (B8) will be located east of I-5 on the north side of the San Dieguito River. This berm will be the longest of the three berms, extending for approximately 4,250 feet from about I-5 east to the end of the Via de la Valle property (DS32). The top of this berm will range from elevation +18.5 feet, NGVD to +19.8 feet, NGVD. This berm, which will have a footprint of approximately ~~8.4~~10 acres, will separate the northernmost intertidal lagoon (W4 and W16) from the San Dieguito River. The purpose of this berm will be to prevent reduction of river velocity and avoid the deposition of river sediments within the intertidal lagoon (W4 and W16). A weir will be incorporated into the eastern end of this berm to eliminate any backwater effect of the berm on the upstream river channel during flood events.

The third berm (B9), located east of I-5 and south of the San Dieguito River, will consist of an eastern and a western portion. The western portion, which will be constructed in an east/west orientation, will be 875 feet in length. The eastern berm, which will run northwest to southeast, will be approximately 625 feet in length. The elevation at the top of the berms will be +19.0 feet, NGVD. The combined footprint of the two portions will be approximately 1.8~~9~~ acres. The two berm segments have been designed to tie into an existing upland area that will be converted to a nesting site (NS14). The western berm will prevent the San Dieguito River flows from entering the intertidal lagoon (W6a and W6b), while the eastern berm will protect the nesting site from overland flood flows from the east.

All berms will be constructed with a landscaped trapezoidal cross-section. The base width of each berm will vary depending on the post-construction ground elevation on either side of the berm. The top of the berms will be approximately 20 feet wide. The slopes of the berms would vary from 2:1 to 3~~4~~:1 depending on slope treatment. The southern side of berm B8, which will be protected with a combination of geogrid reinforced imported fill, stone revetment, and vegetation, will have a slope gradient of 3:1. The top elevation of the slope will be above the design high water elevation. In general, the top of the berms will range from +16.5 feet, NGVD ~~at about river mile 0.75~~ to +19.8 feet, NGVD~~ at river mile 2.1~~.

These berms will not control the extent of flooding or change water levels, but rather the berms will direct river flow, maintain existing water velocities, and maintain sediment transport during storm events. Culverts ~~may~~ will be placed through the two main river berms (B7 and B8) to help balance water levels in the tidal lagoons and river channel during flood events.

The tops of the berms will be revegetated except where trails or maintenance paths are provided. The slopes of berms B7 and B9 and the northfacing slope of berm B8 will be revegetated with the native species and erosion preventative vegetation. The riverside of berm B8 will be provided with additional slope protection. The methodology for berm maintenance (vegetation and slope protection) will be included as part of the final permitting and design phase.

4.2.9 Slope Protection

The restoration project requires slope protection for several elements, including the berm slopes, one section of the San Dieguito River bank, ~~one of the adjoining freeway slopes,~~ the slopes formed to create nesting sites, and the slopes created to dispose of dredge material in upland areas. After futher analysis, it was concluded that there is no need for additional protection of one of the adjoining freeway slopes. Proposed slope protection ranges from armoring to the use of erosion control landscaping.

Stone revetments will be used as slope protection in three areas. These areas are indicated on Figure 4.6. The westernmost area (identified as Stone Revetment No. 1) will protect the portion of the San Dieguito River bank that is located approximately 600 feet east of the Jimmy Durante Bridge. The area is situated on the south side of the inlet channel where the San Dieguito River turns and flows in a northwest direction. This 600±-foot long section of stone revetment will be placed on the south side of the inlet channel in order to protect the slope from changes in river scour associated with river flow modifications stemming from the

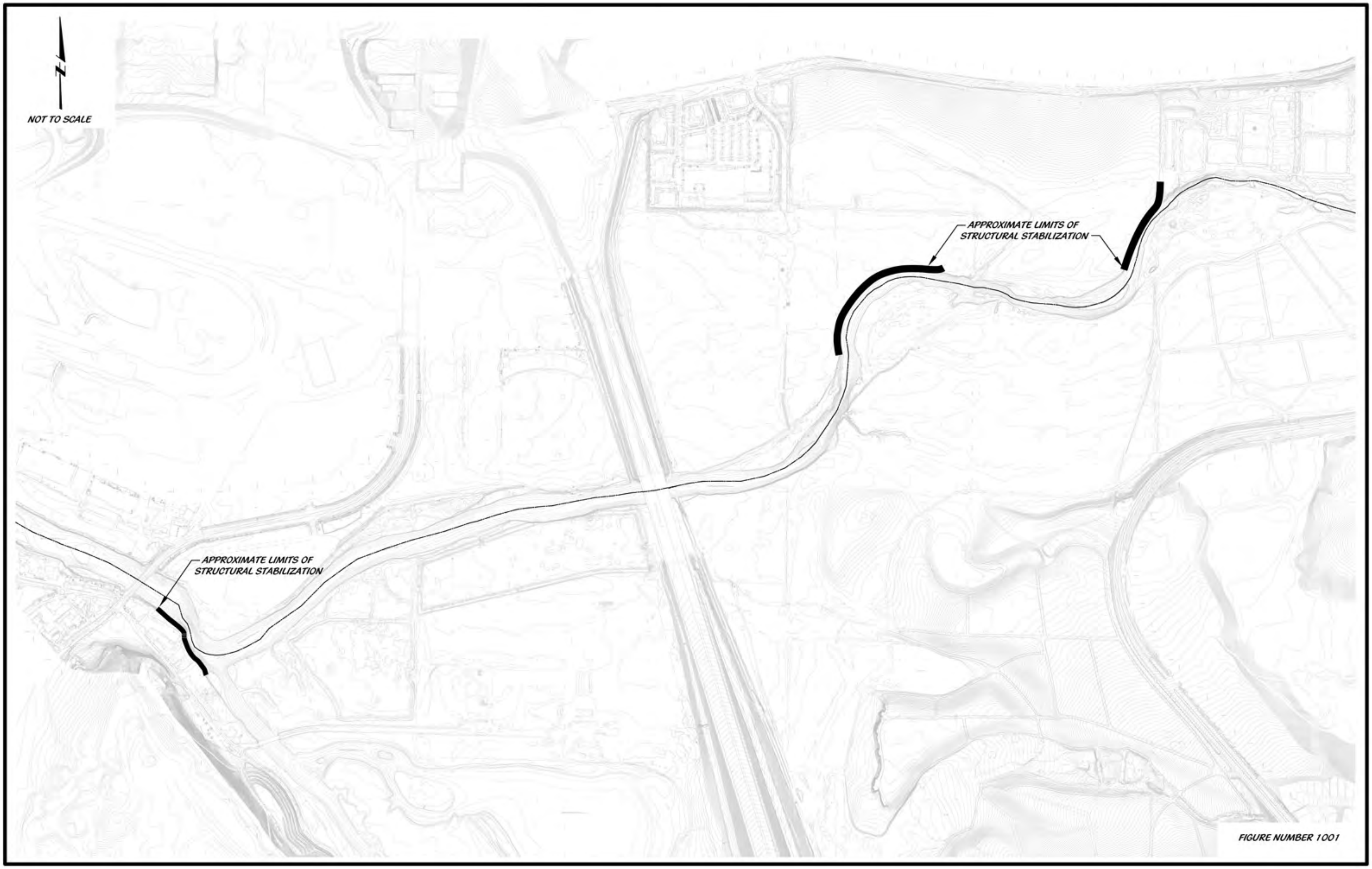


Figure 4.6. Stone Revetment Locations

creation of the tidal basin (W1). Figure 4.7 shows a typical section of slope protection at this location. Note that the majority of this rock extends well below the tidally-driven water surface, with the only exposed rock essentially cleaning up and providing a uniform protective edge to the coastal trail in this vicinity.

Stone Revetment No. 2 is approximately 1,200 feet in total length and located approximately 1,800 feet upstream of Interstate 5, protecting the concave bend in the current river alignment where the proposed earthen berm would be at risk from increased scour associated with flood flows passing through this 460~~600~~± foot radius bend in the river. As with Stone Revetment No. 1, this 90+ degree bend in the river generates relatively deep design scour depths, requiring a stone revetment throughout the entire bend to protect both the berm and the underlying streambank material supporting this northerly berm, which in turn protects the Wetland Area W4. Figure 4.8 shows a typical section of slope protection at this location.

Stone Revetment No. 3, located approximately 1,500 feet upstream of Stone Revetment No. 2, is approximately 700 feet in total length and abuts up to the western edge of the horse park, providing additional scour protection to the easterly edge of the earthen berm, separating the Wetland Area W4 from the main river. As with Stone Revetment Nos. 1 and 2, Stone Revetment No. 3 also provides additional scour protection to the most upstream river bend, where an existing approximately 720~~950~~-foot radius bend in the river initiates channel meandering within the lower reaches of the San Dieguito River system downstream of the El Camino Real bridge. Stone Revetment No. 3 also incorporates an approximately 28~~9~~5-foot-wide weir section designed to bypass a small portion of flood flows exceeding the 25-year design storm (approximately 14,000 cfs) in order to eliminate any upstream backwater effects associated with the proposed project. Figure 4.9 shows a typical section of the rock slope protection through the upstream weir section. Figure 4.10 illustrates the plan view of the weir.

All of the stone revetments utilize launching aprons designed so that as scour occurs, the rock revetment can launch or flex downward sufficiently to prevent the scour from undermining the river bank and causing geotechnical instability of the overlying berm. The launching apron has been designed in conformance with the U.S. Army Corps of Engineers Waterways Experiment Station (WES) Stream Investigation and Streambank Stabilization Handbook. The "self-launching" approach offers economy and ease of construction by allowing the stream, rather than the contractor, to perform the excavation. However, it does require a larger volume of rock toe protection than would be required if the toestone were extended down to the design scour depth necessary for bank protection. The self-launching approach also minimizes environmental disturbance in wetland areas, while still providing the necessary toe protection considered essential to the long-term stability of the earthen berm.

In citing the advantages of the stone revetment from the WES Streambank Stabilization Handbook, "It's performance has been so thoroughly analyzed by research and practical application in a wide range of conditions, stone armor can be designed with an especially high degree of precision and confidence. The American Society of Civil Engineers Task Committee on Channel Stabilization Works stated in 1965 that 'Stone is the most commonly used material for upper bank paving for revetment works and in most cases has proved superior to other materials because of durability and the ability to conform to minor irregularities in the slope.'" The WES Streambank Stabilization Handbook, published in 1997, although acknowledging the benefits of a variety of manufactured proprietary armor

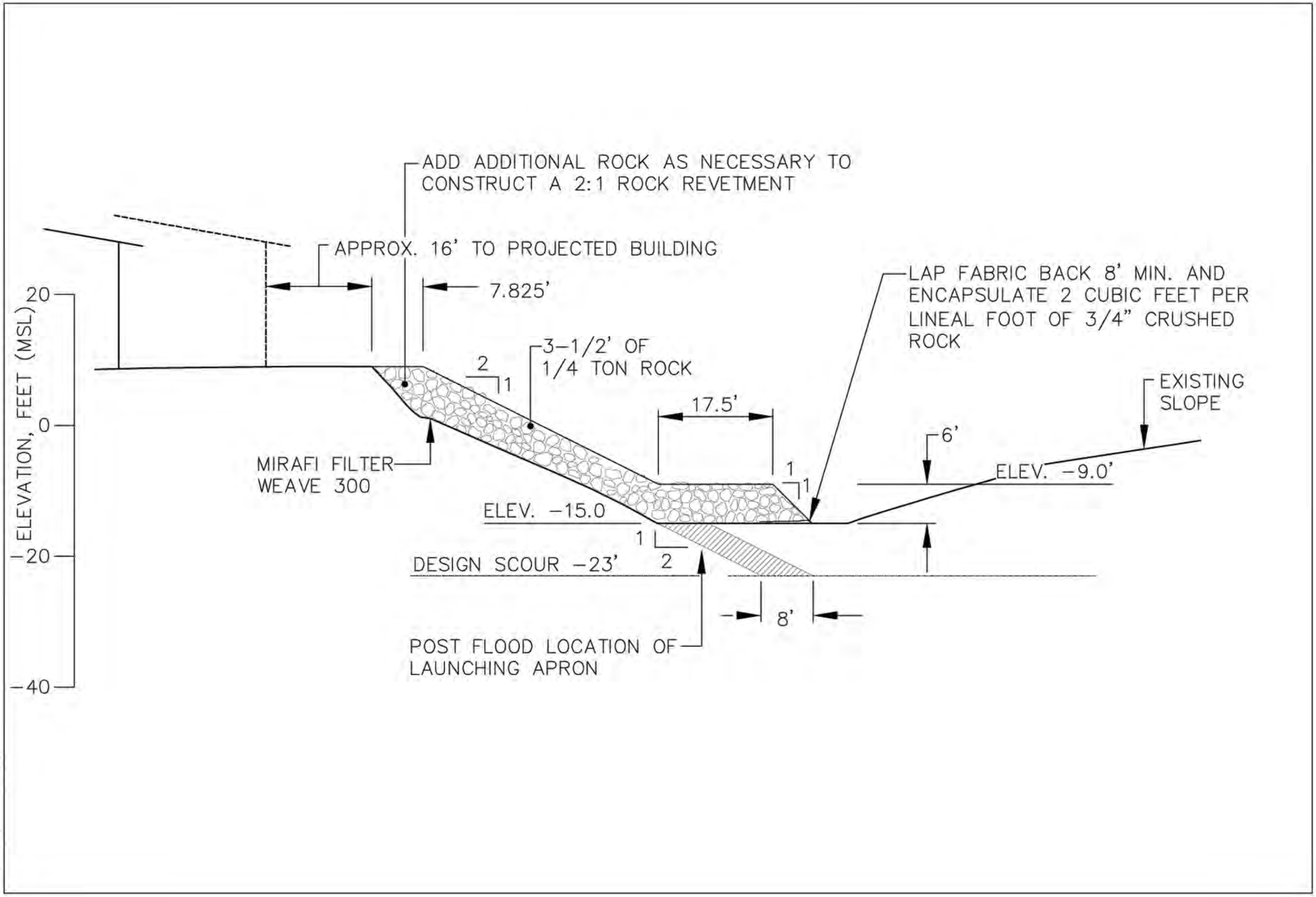


Figure 4.7. Typical Section of Slope Protection Stone Revetment No. 1

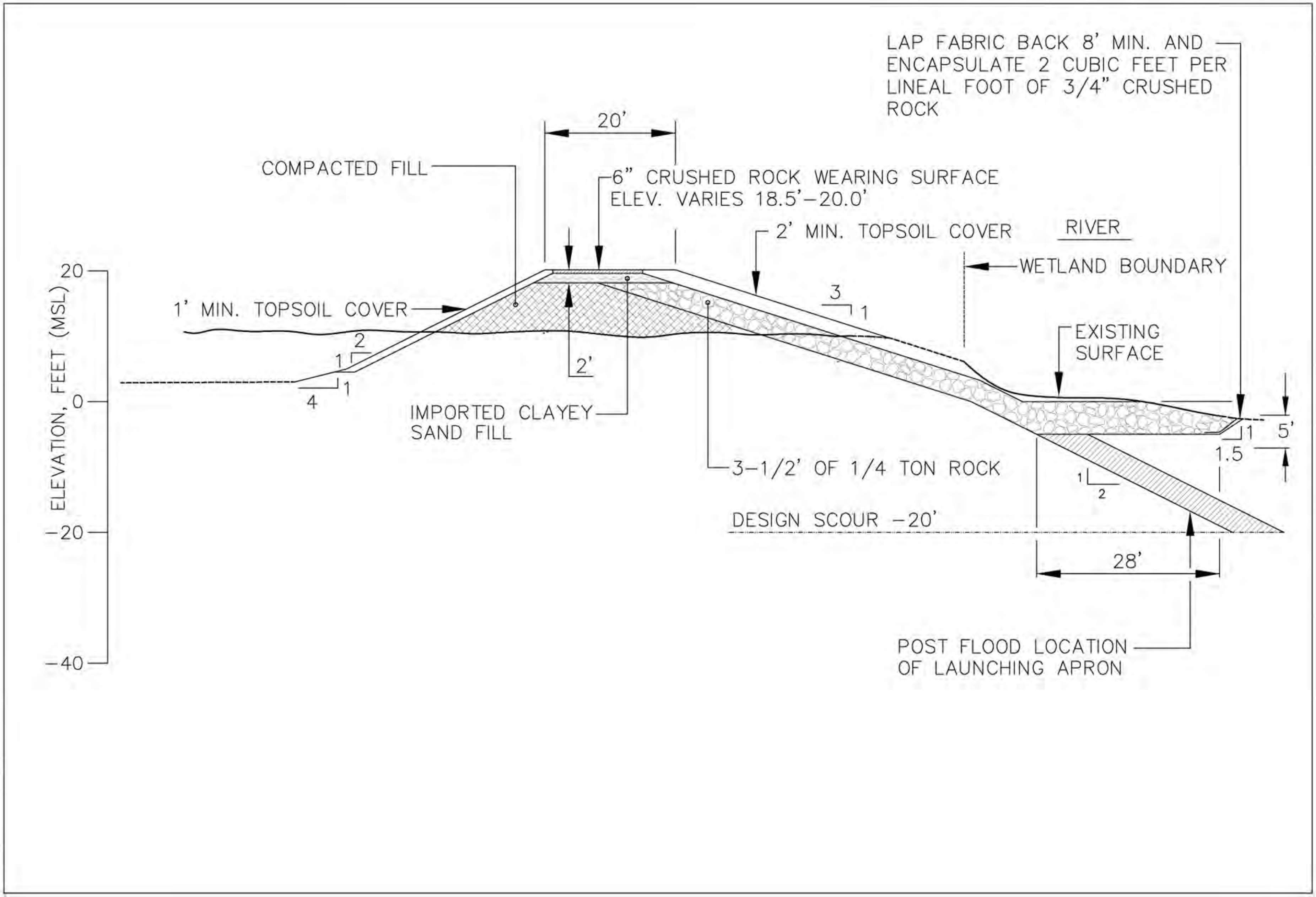


Figure 4.8. Typical Section of Slope Protection Stone Revetment No. 2

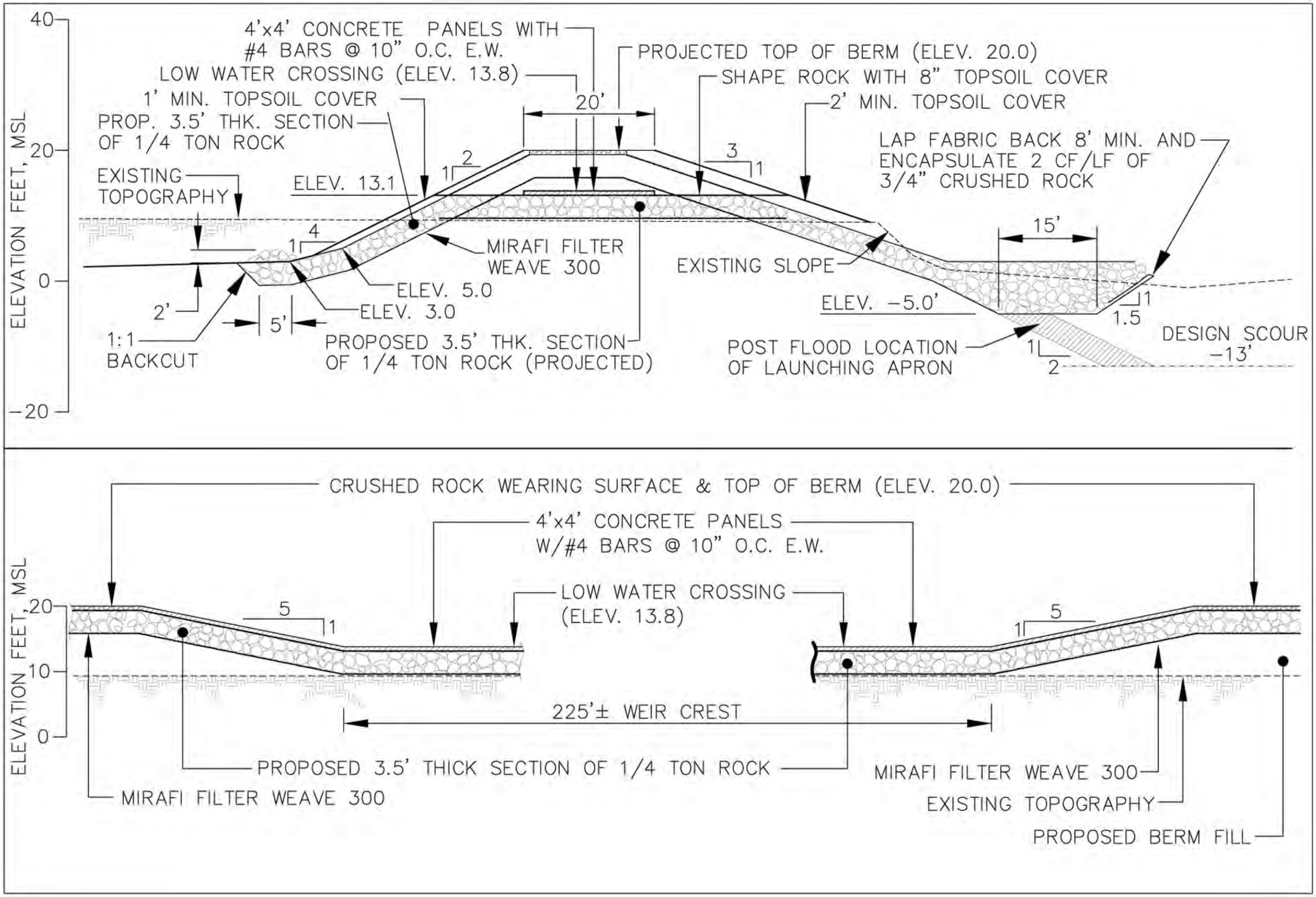


Figure 4.9. Typical Section Rock Slope Protection Through Upstream Weir Section

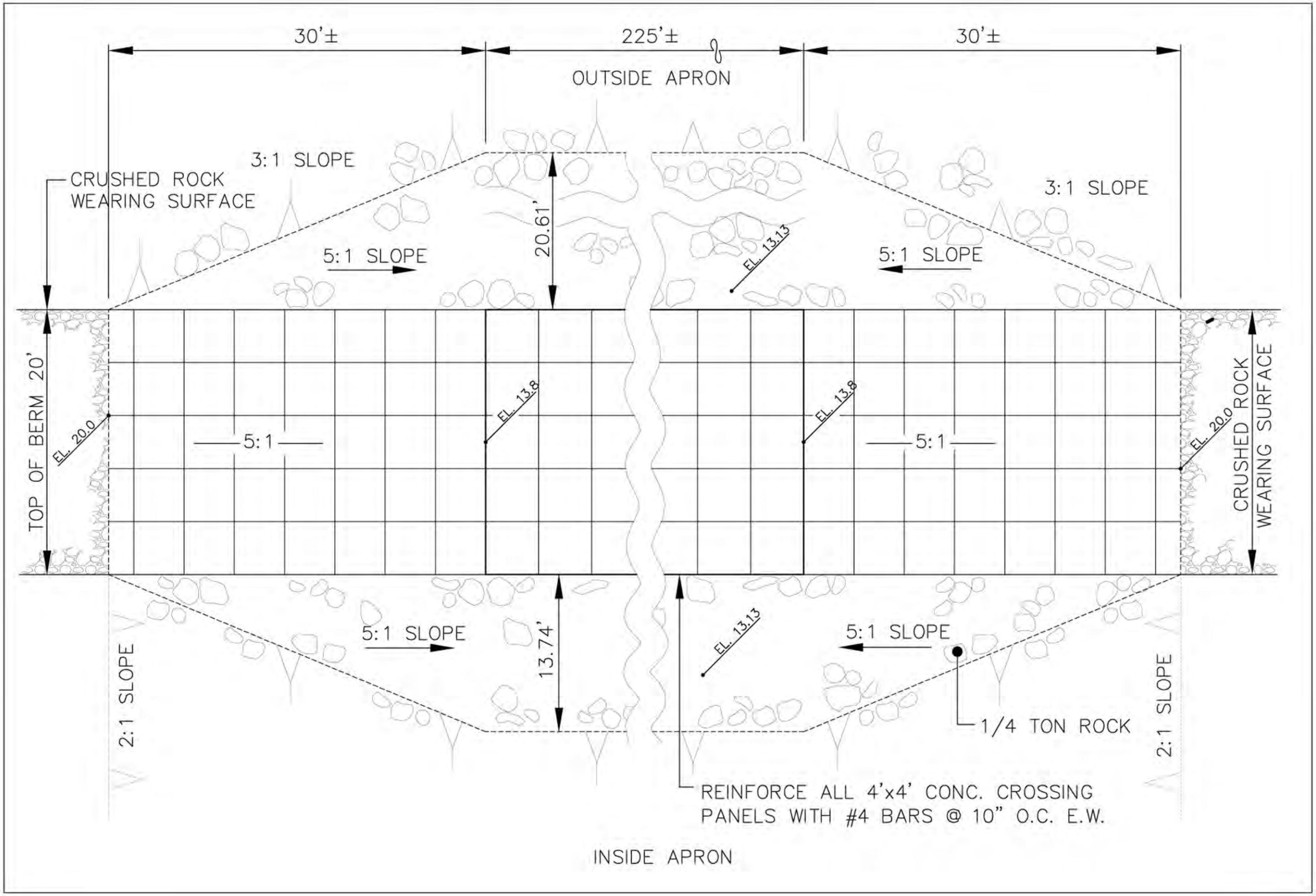


Figure 4.10. Plan View of Upstream Weir Section

materials, particularly if toe protection were extended down to the design toe scour elevation, concluded that stone armor is particularly advantageous when a launching apron is utilized in lieu of full-depth excavation to provide toe protection down to the maximum predicted design scour depth.

A geosynthetic filter fabric will be installed to prevent the loss of sediments from behind and beneath all three stone revetments. The filter fabric will incorporate a pleated section below the launching apron to accommodate differential erosion beneath the apron and include a weighted end to maintain contact with the developing scour hole, while still protecting the underlying streambank sediments from flood-induced scour as shown in Figure 4.11.

The remaining portion of the earthen berm along the northern side of the channel upstream of Interstate 5 incorporates a 20-foot-wide geogrid-reinforced imported erosion-resistant clayey sand fill to minimize flood-induced streambank scour along the southern slope of the berm. The earthen berm maintains a 20-foot-wide top width, with a 6-inch minimum crushed rock wearing surface to accommodate limited vehicular traffic. Figure 4.12 shows a typical section of the geogrid-reinforced berm.

In the vicinity of the easterly weir, near Station 2.31, the weir side slopes descend at a gradient of 20 percent (a 5:1 slope inclination) to accommodate vehicular traffic atop the berm. Figure 4.10 shows this in plan view. As there is an approximately 6-foot depression in the northern berm to accommodate the weir, and the 20-foot travelway is maintained through the weir section, about 20 feet of rock exists on the river side of the concrete roadway surface, and 13 feet on the northerly wetland side of the weir. All of this rock will also be covered with topsoil and revegetated. With the weir only being inundated on average once in 25 years, this vegetated section should also stabilize well.

Several feet of topsoil mantles the majority of the project limits, most of which will be stockpiled and re-used as capping material to facilitate revegetation. A considerable amount of the underlying soils consist of fine sands and fine sandy silts, both of which are highly susceptible to streambank erosion. Near-surface estuarine deposits also exist, consisting of soft silty clays and clayey to fine sandy silts, generally considered suitable for re-use as exposed mud flats, however again highly erodible and unsuitable for the exposed southerly face of the earthen (B8) berm fill. As indicated in Figure 4.12, the interior core of the geogrid-reinforced earthen berm, including those areas protected by stone revetment, could all be constructed with on-site fill soils.

As indicated in the figures for both the stone revetments and the earthen embankment, stockpiled topsoil will cover both the southerly and northerly embankment slopes to facilitate the revegetation of the northern river berm. Although the geogrid-reinforced imported erosion-resistant clayey sand fill and the stone revetments are intended to minimize streambank erosion, it is this outer 1- to 2-foot-thick topsoil cover that will first be exposed to streambank scour, possibly requiring occasional reapplication where any large areas of stone revetment become exposed, or possibly the more sterile erosion-resistant imported clayey sand fill. It is the intent, however, that the existing topsoil cover will facilitate germination of native plant species, and although some streambank erosion is anticipated within this topsoil cover, the vegetation, once established, will help stabilize and minimize the need for any rehabilitation of the surficial topsoil cover.

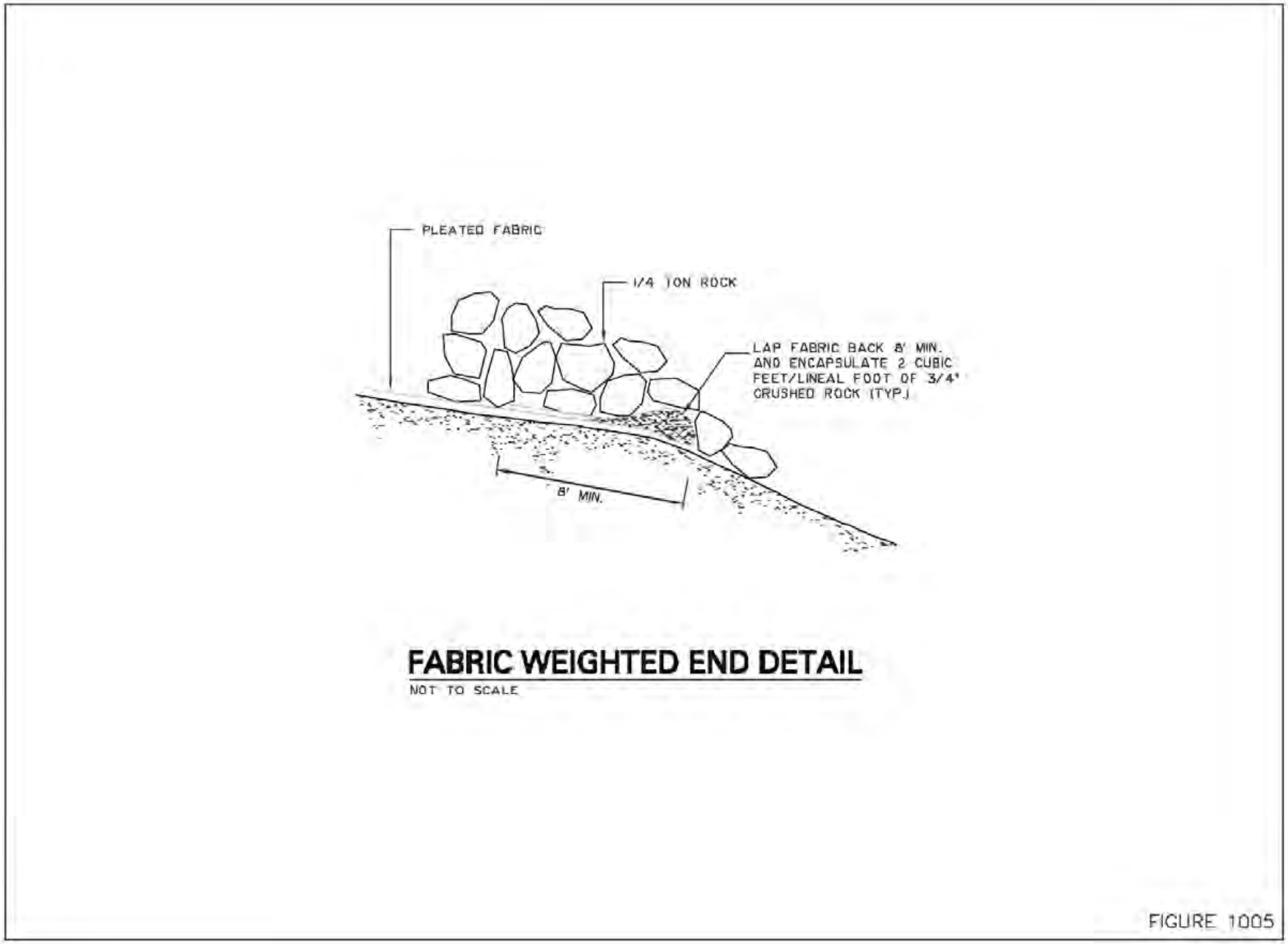


Figure 4.11. Typical Section of Weighted Fabric End

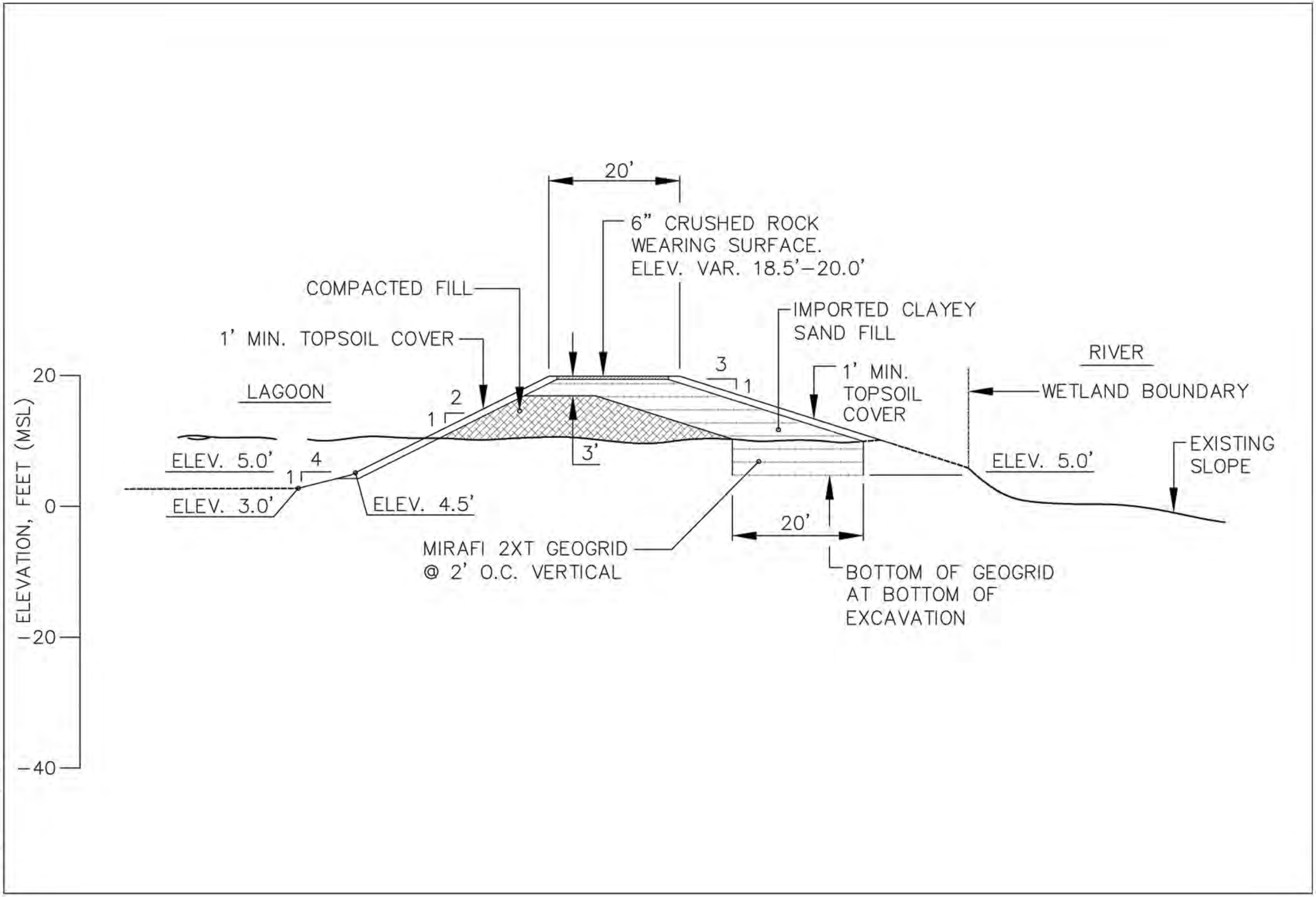


Figure 4.12. Typical Section of Geogrid-Reinforced Imported Fill Berm for (b8)

It should be noted that in the 1997 preliminary restoration plan for the San Dieguito Wetlands Project, it was envisioned that slope protection might include articulated concrete block (ACB) mats to help control erosion. Use of ACB mats has been dropped from the final design for two primary reasons; the first being their need for placement down to the design scour depth, which is considered to be environmentally disruptive and ultimately more expensive than a conventional stone revetment. Consideration of the ACB mats along the base of the earthen berm was also originally envisioned from elevation +5 to elevation +10$^{\pm}$. Although acceptable as an erosion control measure, the ACB mats remain considerably less effective than the topsoil cover for vegetation, with the stone revetment providing an excellent underlayer for the 2-foot minimum topsoil cover. It was ultimately concluded that the stone revetment would provide a superior environmental finished product than that provided by ACB mats.

The 1997 preliminary restoration plan also considered the use of geotextile reinforcement (as required) above elevation +10 feet on the river side of Berm B8 above the ACB mats, also for erosion control. In the final design, erosion control above elevation +10 feet has been provided with a 20-foot-wide geogrid-reinforced erosion-resistant imported clayey sand buttress fill in the linear sections of the berm and stone revetments in the two concave river bends. Both of these erosion control measures will still be capped with one to two feet of revegetated stockpiled topsoil. It should be noted, however, that consideration is still being given to eliminating the stone revetments above elevation +10 feet, as originally shown in the preliminary restoration plan and capping the upper portion of the berm with an erosion control blanket, with consideration being given to a high performance turf reinforcement mat, such as Pyramat™ by SI GeoSolutions.

4.2.10 Erosion Control

The restoration project will involve the construction of berms and nesting sites and will require the disposal of excavated material, some of which will be placed in adjoining upland areas. Such activities will result in the construction of manufactured fill slopes that will be subject to erosion. Measures have been incorporated to minimize the potential for erosion. These include vegetating the graded areas with native plants in order to stabilize excavated materials, as well as implementing additional erosion control measures in areas with greater than 6:1 slopes. The measures proposed are based on the City of San Diego's Erosion Control Guidelines contained in the City's *Landscape Technical Manual* (City of San Diego 1989), as well as from the Best Management Practices Manual (BMP 1993).

On those berm slopes that will not be structurally reinforced, the soil slopes will be planted with native species effective in slope stabilization and erosion control. Additionally, the northern river berm upstream of Interstate 5 will include the importation and placement of a 20-foot-wide geogrid-reinforced erosion-resistant clayey sand fill to further protect the river berm outside of Stone Revetment Nos. 2 and 3. The following procedures will be used to revegetate the slopes of upland disposal areas.

The revegetation effort will consist primarily of applying native plant hydroseed mixes on prepared slopes. The hydroseed slurry will include soil-binding tackifier and site-specific plant mixes as determined by the permitting agencies. A polymer soil sealant may also be applied as a tackifier on steeper slopes for additional erosion protection. Additional methods of erosion control could include the use of soil sealant, mulching, or erosion blanket (e.g., jute matting). Important considerations in selecting an appropriate erosion control measure will include percent slope, time of year, typical wind direction, overland water flow amounts and velocity, biodegradability, and how long the material will remain in place before plants are sufficiently established.

Seeding will be done when the available soil moisture is at least 75 percent of the field capacity at a depth 12 inches below the soil surface, preferably between October 15 and December 31.

The native plant mixes proposed for hydroseeding in the disposal areas have been selected based on compatibility with native vegetation growing on adjacent lands. Parameters that could affect plant species choice within a given area include soil pH, salinity, nutrient composition, organic matter composition, soil texture, and percent sand. Appropriate amendments will be added as required to ameliorate unfavorable soil conditions. The seed mix contains herbaceous and shrub species that will grow to varying heights. Seeding of the berms and disposal areas will provide for erosion control initially through the inclusion of naturalized nurse crop species designed to hold soil until native plants become established.

Mulching with straw mulch or oak wood/leaf fibers could be used as an alternative to soil sealant or jute netting on less steep slopes. Availability of suitable mulching material may limit the application of mulch. Straw mulch will be uniformly spread at the rate of two tons per acre. Shredded wood products, if used, will be uniformly spread to a minimum depth of two inches.
~~The restoration plan includes a proposal to construct temporary drainage crossings for construction access. Straw bales will be placed below the downstream terminus of these temporary culverts to trap sediments. Any excess earth spoil drift will be removed from the drainage channel by hand labor. Straw bales will consist of native grasses, rice straw, or excelsior matting.~~

Straw bales will be used in areas of shallow bedrock where keying of silt fencing will not be possible and below the outlet of temporary slope drains and culverts. Straw bales will be anchored with steel posts. Straw bales also will be placed across dirt access roads during rainfall events to filter runoff. Straw bales will be removed from the site upon project completion and disposed of at the Miramar Landfill.

Sufficient e~~E~~mergency erosion control materials~~, including 200 straw bales, 50 5-foot steel posts, 100 sandbags, 500 feet of silt fencing, and 2,500 square feet of jute netting,~~ would be stockpiled on-site prior to construction. A suitable labor force will be available to install any required emergency erosion control materials during or after storms, or if materials have been damaged during construction, or if additional materials are required to help prevent erosion and siltation.

Silt fencing could be used on the site for sediment trapping and filtering and to delineate exclusionary areas. Silt fencing specifications are summarized below.

- Prior to construction, place silt fencing around downslope perimeters of areas that are to be dredged and in the disposal areas.
- Place silt fencing between construction areas adjacent to sensitive habitat including wetland and riparian areas.

- Place silt-fencing downslope from topsoil stockpile areas.

The locations of the proposed basins are illustrated on Figure 4.13.

4.2.11 Other Infrastructure Considerations

There are five bridge crossings of the San Dieguito River within the project boundaries. These include from west to east: a road crossing at Camino Del Mar (Highway 101), the North County Transit District railroad crossing; the road crossing at Jimmy Durante Boulevard, the I-5 freeway crossing, and the road crossing at El Camino Real. Also included in the project boundary is an old bridge that is no longer in use for vehicles. This bridge, referred to as the Grand Avenue Bridge, is located to the south of the river in an area previously restored by CDFG.

Several measures will be implemented during construction to protect these bridges. For the Camino Del Mar and railroad bridges, protection will include the staking of bridge foundations prior to excavation to prevent contact with construction equipment or undermining of foundations. In addition, scour around the foundations of the bridges will be prevented by maintaining passage of current volumes of river sediments past these structures. The latter measure will be accomplished through construction of the river berms as discussed previously. There is an existing stone revetment along the east side of the freeway north of the river that protects the I-5 embankment from river scour. A stone revetment was originally proposed in this area. However, the existing revetment appears to be in good condition and is effectively protecting the I-5 embankment in this area.

There is an 8-inch sewer force main, which crosses the San Dieguito River between the Jimmy Durante Boulevard Bridge and NCTD Bridge. It is anticipated that this sewer force main will be relocated prior to construction by the 22nd Agricultural District. Excavation of the river channel may be required in proximity to this sewer main if the river bottom elevation exceeds the minimum design depth in this area. The minimum design depth in this portion of the channel is –3 feet, NGVD. The northern half of the Grand Avenue Bridge will be removed leaving the southern half as a viewing platform for visual access to the restored wetlands (e.g., birdwatching).

4.2.12 Buffers

A buffer with an average width of 300 feet and a minimum 100-foot buffer, as measured from the upland edge of the transition area, will be provided surrounding all project components as depicted in Figure 4.14. The buffer area will be left in the current condition.

4.2.13 Construction Methods

Project construction may occur in dry or wet soil condition. Either condition will involve constructing water level controls to keep water out so that excavation could take place with backhoes and other land-based equipment. Wet condition construction will entail actively flooding areas so that material could be removed using hydraulic dredging equipment.

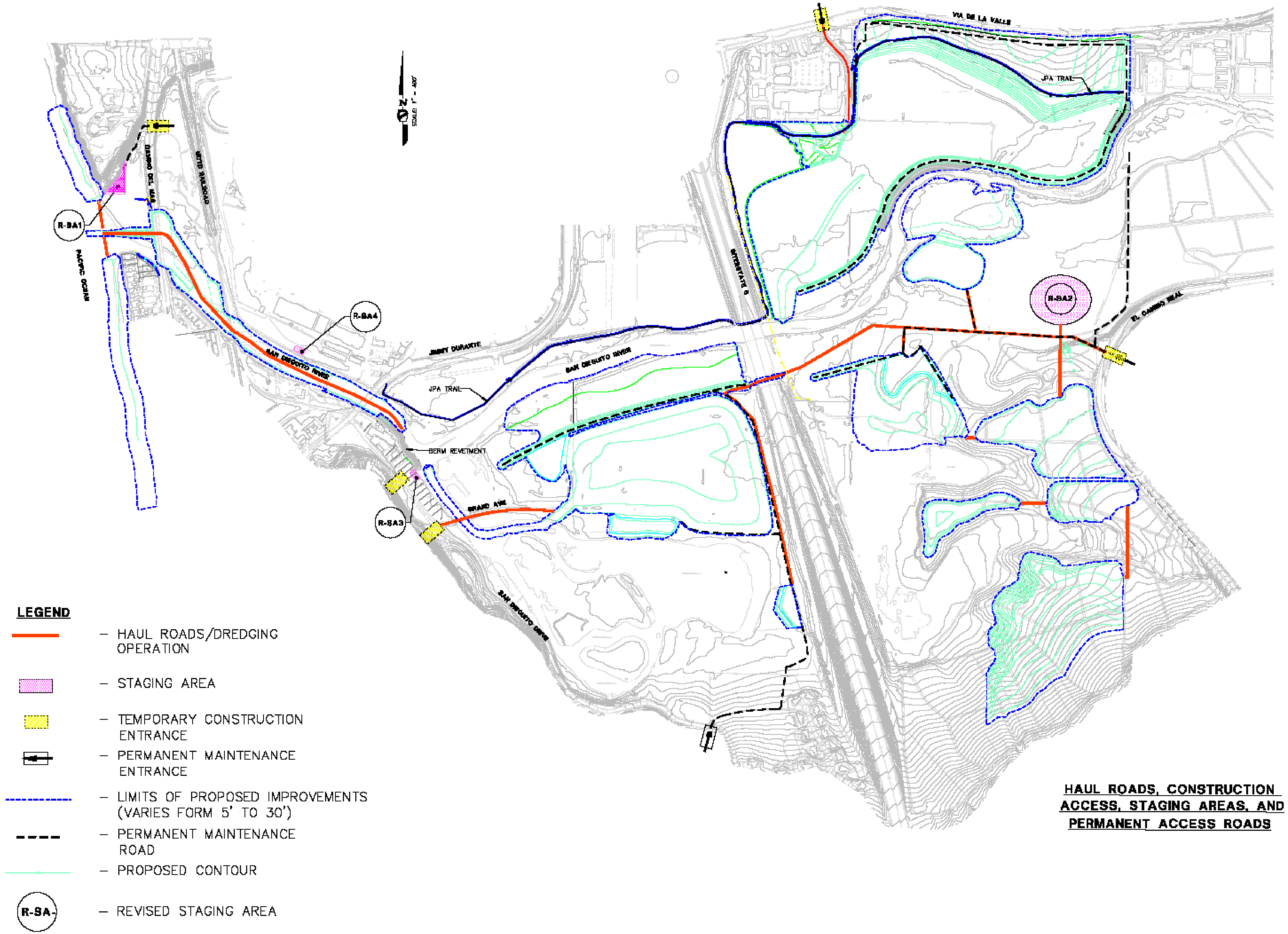


Figure 4.13. Potential Haul Roads, Construction Access, Staging Areas, and Desilting Basins

Figure 4.14. Buffer Zone Boundaries

Possible construction methods based on past projects of a similar nature are presented below. The contractor will determine the actual methods used to construct the restoration project once the construction bid documents have been completed.

4.2.13.1 Earthwork Methods and Equipment for Dry Condition Method

Construction will occur in three areas. The three areas of construction are described below.

Due to the sensitive response of habitat to tidal inundation proper grading will be important during construction. SCE will carefully oversee grading work to ensure that target elevations are achieved in order to avoid the need for any future remediation.

Area I

Area I is located west of I-5 and will consist of mobilizing equipment and designating the construction access routes and staging areas for the area. This will be followed by salvaging wetland vegetation from W1, W2a, and W2b for storage and propagation offsite. Once this is complete, remaining structures will be demolished and the airfield property (W1) will be cleared and grubbed. Cleared and grubbed material will be removed by truck. ~~A river crossing structure may be constructed in the San Dieguito River to allow for material and equipment transport across the river. This structure will have culverts to maintain low river flow and control tidal flow beyond this point. The structure in the San Dieguito River will be removed prior to each significant rain event and reconstructed as needed.~~

After salvage of wetland vegetation and subsequent clearing of non-native vegetation, W1 will be excavated down to elevation –6.0 NGVD. W2a and W2b will be excavated down to elevation +2.0~~3.5~~ to +4.5 feet, NGVD. The excavated soil ~~may~~ will be used to construct the nesting sites and berm (B7), which is located to the north of W1. A UXO technician will be on-call to evaluate suspicious or unknown items that might be uncovered at the airfield property.

~~The tidal inlet channel will be excavated as described previously. The sand generated from this operation will be hauled by truck to the proposed nesting sites and/or the beach where it will be spread. This entrance channel will be maintained on a seasonal basis, as needed, during construction.~~

W1, W2a, and W2b will be revegetated in accordance with the Project Planting Program with salvaged stores of wetland plant material.

A stone revetment (Stone Revetment No. 1) will be placed along the inlet channel at the confluence with the San Dieguito River.

Towards completion of project restoration, the tidal inlet channel will be excavated as described previously. The sand generated from this operation will be hauled by truck to the proposed the beach disposal area where it will be spread. This entrance channel will be maintained on a seasonal basis, as needed, during construction.

Area II

Area II is located east of I-5 and south of the San Dieguito River. Wetland vegetation will be salvaged from Areas W5 and W10 as described in Area I. Elements W5 and W10 will then be cleared and excavation activities will begin. Restoration element W5 will be graded to final elevations between +2.0 feet, NGVD and +4.5 feet, NGVD leaving a target habitat distribution of low and mid salt marsh. Restoration element W10 will be graded to a final elevation of +4.5 feet, NGVD leaving a target habitat distribution of high salt marsh. Unwanted vegetation removed during clearing will be hauled by truck for disposal offsite. Some of the excavated material may be used to construct the southern river berm (B9) and the bases of nesting sites (NS11, NS12, NS13, and NS14). Utility poles east of I-5 will be relocated and approximately ~~55,000~~50,000 cubic yards of sand for nesting sites (NS11, NS12, NS13, NS14, and NS15) will be spread over the sites. W5 and W10 will be revegetated, in accordance with the Project Planting Program, using salvaged stores of plant material. ~~A river crossing structure may be constructed in the San Dieguito River to allow for material and equipment transport across the river. This structure will have culverts to maintain low river flow and control tidal flow beyond this point. The structure in the San Dieguito River will be removed prior to each significant rain event and reconstructed as needed.~~

Area III

Area III is located east of I-5 and north of the San Dieguito River. The existing wetland vegetation will be salvaged, as needed, from W4 and W16 and stored offsite for propagation. These sites will then be cleared and the unwanted vegetative material hauled by truck for disposal offsite. Excavated material above +3.0 feet, NGVD may be used to construct the river berm proposed to the north of the river (B8). Excavated material above and below +3.0 feet, NGVD may be used to construct the upland portions of the Via de la Valle area (DS32). The berm slope face on the riverside will be protected with a combination of rock slope protection and native vegetation. A weir will be constructed at the northeastern end of the berm. The wetland and upland areas of W4 and W16 will be revegetated with salvaged or purchased stores. The SDG&E lines located along the southern end of W4 will be relocated as a cooperative agreement between SCE and SDG&E. The proposed re-alignment of the SDG&E power lines is depicted in Figure 4.15. The equipment will be demobilized and the construction staging areas and access areas will be uncompacted, revegetated, and restored where they were disturbed by construction.

4.2.13.2 Earthwork Methods and Equipment for Wet Condition Method

The elevation of groundwater for a given area will determine the method of excavation used. Typically, dredging equipment requires at least three feet of ponded water for operation. Within the restoration project, boreholes drilled in 1998 (Ninyo & Moore 1999) encountered groundwater between elevations –3.0 feet, NGVD and +9.0 feet, NGVD with the average groundwater elevation at about +5.3 feet, NGVD. The deepest excavations for the restoration project east of I-5 are at an elevation of -1.0 feet, NGVD, excluding the launching apron excavations, which extend to elevation -5 feet. Therefore, excavations to the east of I-5 may be too high in elevation to be economical for wet excavation. West of I-5, the deepest excavations range from –6.0 feet, NGVD to –2.0 feet, NGVD (-8 feet for the Stone Revetment No. 1), which is well below the average groundwater elevation. Therefore, wet excavation may likely occur in Area I (west of I-5) only.

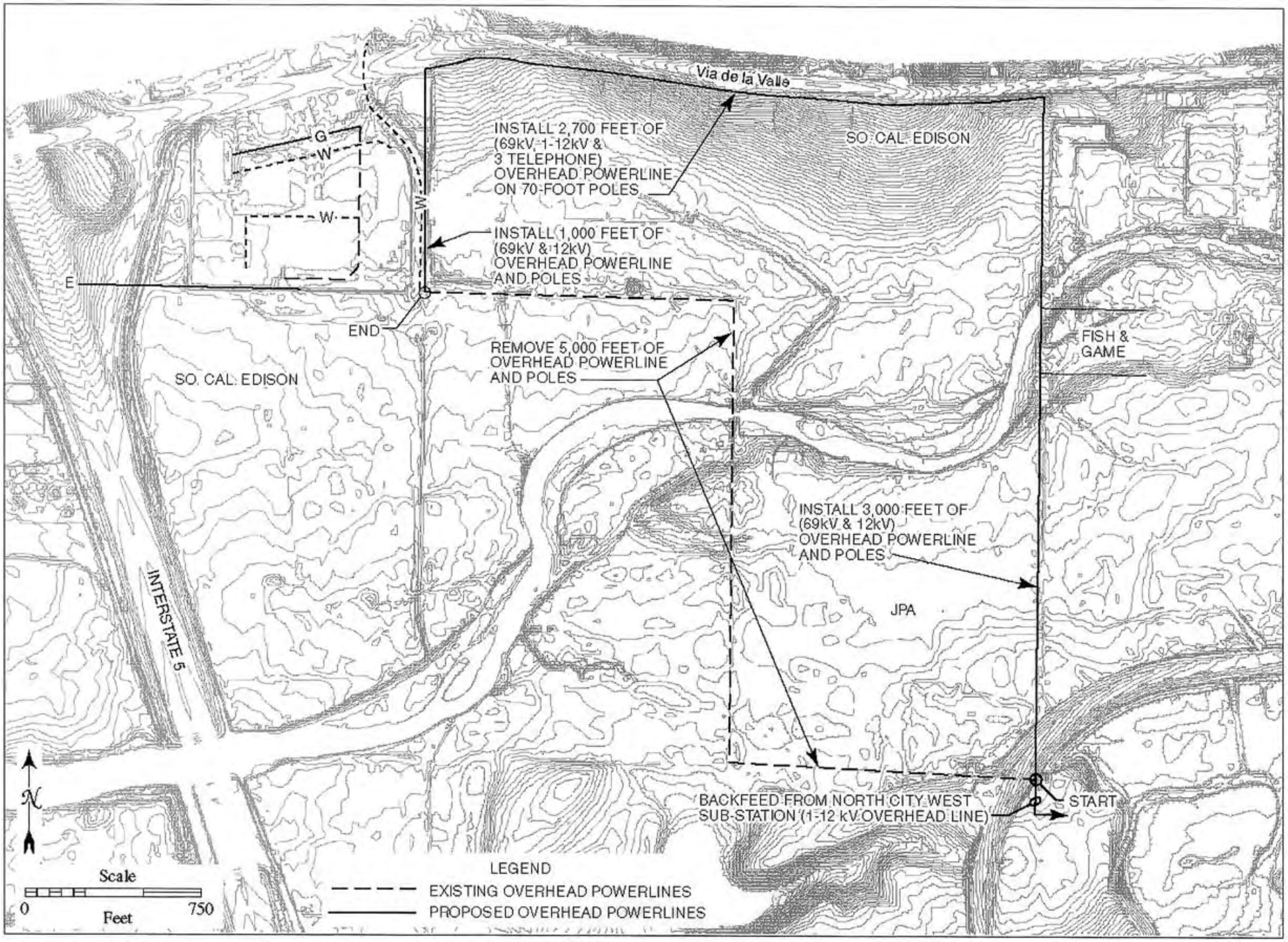


Figure 4.15. Proposed Powerline Relocation

Opening the channel to tidal exchange may yield a water source that may permit hydraulic dredging in the lagoon access channel east of the Jimmy Durante Bridge. Dredging up the channel to the lagoon basin may be accomplished using floating equipment. Sediments may be pumped to disposal sites (DS32-DS36) identified for placement of excavated and dredged material east of I-5. From the lagoon access channel, the dredge may continue excavation of the lagoon basin from the elevation at which dry excavation is halted to the elevation of –6.0 feet, NGVD. Creation of the mild slopes between +3.0 feet, NGVD and –2.0 feet, NGVD may be constructed using conventional excavation equipment. A portion of the slope excavation may be conducted using land-based equipment, such as a dragline, for elevation control where the water is too shallow for dredging. It is assumed that the excavation may be made using hydraulic dredging below elevation 0.0 feet, NGVD.

Excavation for the launching aprons would generally be within a relatively confined linear trench parallel with the proposed berm alignment. Maximum trench widths for the launching apron locally approach 50 feet near Station 1.75. However, typically, the launching apron trench width ranges from 20 to 30 feet. East of Interstate 5, the launching apron trench excavation depth typically extends to elevation -5.0 feet, NGVD. However, in all instances, these relatively linear excavations maintain a confined southerly slope, enabling the excavation to be made with a large excavator or Gradall in the wet, with elevation control provided by a grade checker in the water. As indicated in Figure 4.16, which is typical of the upstream launching apron excavation requirements, this trapezoidal excavation, although excavated in the wet, was chosen as it provides an excavation depth that contractor crews can still work in, albeit chest-deep in water.

4.2.13.3 Storage and Replacement of Topsoil

Implementation of the restoration project at San Dieguito Lagoon will require excavation of soil to obtain the desired grades and contours. The excavation will include removal and/or storage of existing topsoil. Construction at each disposal site also will cover or displace the existing topsoil. The topsoil from the project will be removed, stockpiled, and replaced to improve the conditions for revegetation at the proposed disposal sites.

The restoration contractor will be required to remove and stockpile the top one or two feet below the existing ground elevation on-site for future distribution. All topsoil may not be suitable for planting; therefore, a qualified soil scientist and/or revegetation specialist will be retained to determine which soils will be suitable for revegetation with native species. In areas with invasive weeds, it may be necessary to discard the top layer of soil or to treat the soil to eradicate weed seeds.

Removing, stockpiling, and replacing topsoil will require double handling of the material. A probable construction scenario will consist of two or more self-propelled scrapers to pick up and transport the topsoil to either a disposal or stockpile location within the project boundaries. A bulldozer will be used to maintain a small stockpile area up to eight feet high. Water trucks will be used to maintain dust control. Depending upon the final distance for distribution, either bulldozers or scrapers will be used to transport and rough grade the topsoil. A motor-grader will be used for final leveling and grading of the site(s).

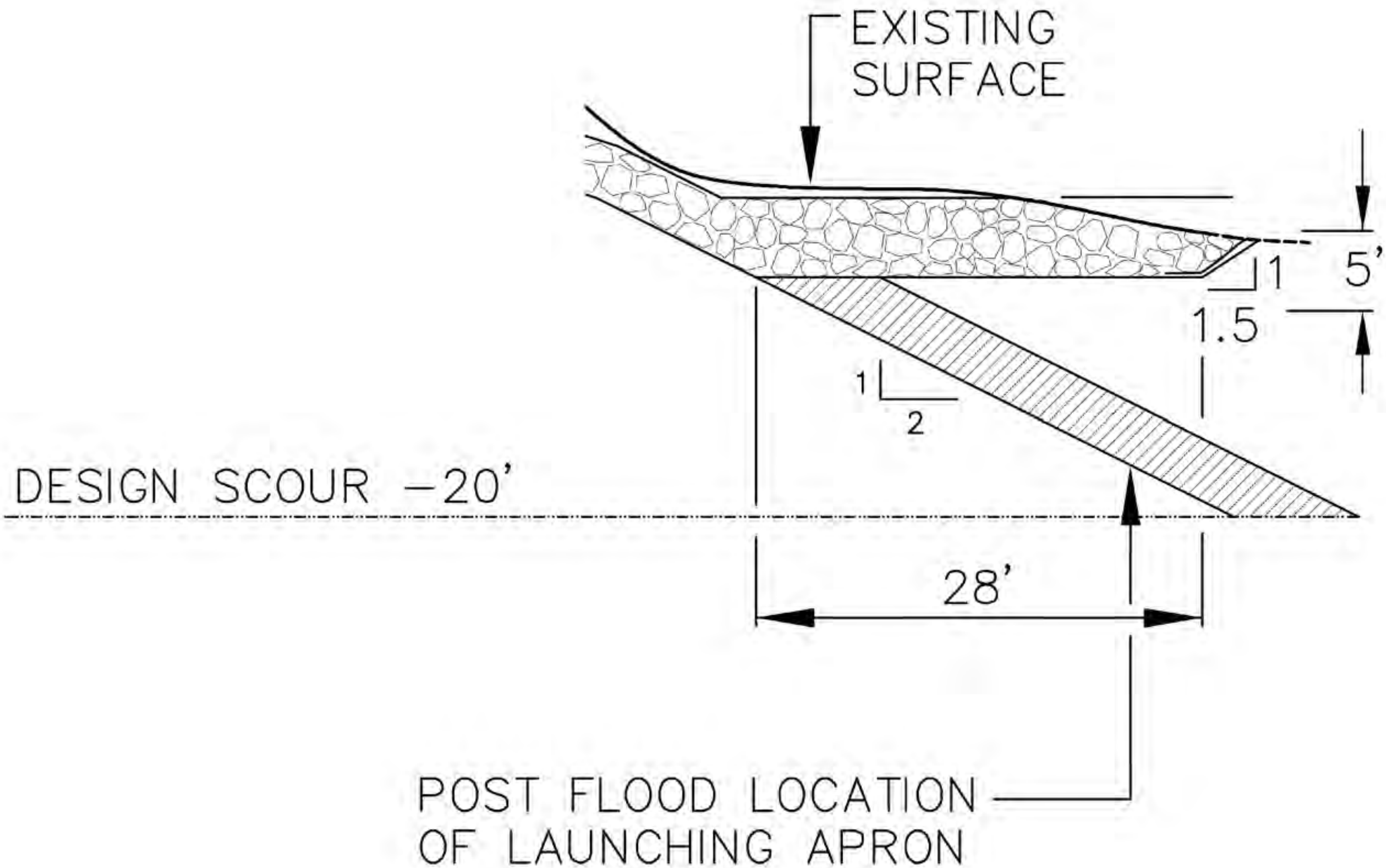


Figure 4.16. Launching Apron

There are approximately ~~86.7~~91.2 acres of potential stockpile area available based on the proposed upland disposal sites. The volumes of topsoil for each disposal site range from ~~21,000~~8,000 cubic yards to 53~~4~~,000 cubic yards for a one-foot layer and ~~43,000~~16,000 cubic yards to ~~108,000~~106,000 cubic yards for a two-foot layer. The minimum stockpile area for the disposal sites ranges from 0.2 to 0.5 acres. The length of time that each stockpile will be present is dependent on the construction schedule and field conditions during construction.

4.2.13.4 Construction Staging Areas Outside Work Zone

In addition to the staging areas within the footprint of the restoration project, construction staging areas will be required outside the work zone to accommodate the staging of construction equipment and supplies. These outside staging areas will be located adjacent to the footprint of the restoration project. As shown in Figure 4.13, ~~two~~ four primary ~~outside~~ staging areas ~~sites~~ are proposed, ~~one~~ three on the west side of I-5 and one on the east.

Some staging and construction areas may need to be closed to the public through the use of temporary fencing in order to address security and safety issues. On the west site of I-5, a staging area is proposed north of the river between the NCTD right-of-way and Jimmy Durante Boulevard on 22nd District property to accommodate staging of equipment for channel dredging. Another staging area is proposed in a disturbed area at the river bend on the south side of the river located on City of Del Mar property. This staging area will accommodate the staging of equipment used in slope protection work at the river bend. The third staging area is proposed on the north side of the ~~the~~ river inlet for channel ~~dredgind~~dredging. This staging area would have an approximate footprint of 100 x 100 feet to reduce potential conflicts with beach activities. On the west side of I-5, a staging area is proposed just south of the river off of El Camino Real.

4.2.13.5 Construction Access Routes

Construction equipment will utilize existing paved and dirt roads within the site and travel will be within the footprint of the proposed construction sites, whenever feasible. However, several temporary construction access roads will be constructed in order to provide access to proposed excavation sites, as well as to accommodate the hauling of excavated materials to the disposal sites. Figure 4.13 illustrates the potential location of haul roads and construction access. The main access points to the site for large construction equipment will be off of San Dieguito Drive, San Andres (from Via de La Valle), Camino del Mar and off of El Camino Real. If necessary, access to the site via the Grand Avenue Bridge (off of San Dieguito Drive) will be available to the contractor, however, it must be noted that this will not be used as primary access for construction vehicles. Construction access roads will be up to 30 feet wide and the roads will be compacted and surfaced with gravel.

The specific alignment and timing for installation of the haul roads indicated on Figure 4.13 will depend on the construction schedule and field conditions. All roads will be designed to avoid impacts to nesting areas and sensitive wetland vegetation, wherever possible. At the completion of the project, the access routes will be uncompacted and replanted with appropriate vegetation as mitigation for impacts caused within the access routes during construction. Maintenance access also will be maintained along the tops of the proposed berms. On the south side of the river, a permanent maintenance road will be designed off of Racetrack View Drive to allow vehicular access to NS15, located west of I-5.

Daily project traffic during construction will consist of the personal vehicles owned by construction personnel, construction management personnel, and various inspectors, JPA, SCE, and other representatives from the various agencies and property owners involved with the project. Construction workers are expected to use one of two main routes to access the construction site on a daily basis.

1. El Camino Real from both north and south directions would be used to reach the Staging Areas east of I-5.

2. Jimmy Durante Boulevard from both north and south directions will be used to access Staging Areas west of I-5.

As described above, the majority of the haul roads will be temporary. Construction will disturb up to a 30-foot-wide area along the access routes and could involve clearing of vegetation, grading, and installation of gravel fill within the roadbed. The roads will require periodic maintenance and dust control will be provided. The intent is to have excavated soil north of the river channel remain north of the river channel and excavated soil south of the river channel would remain south of the channel. This will minimize disturbance to the existing San Dieguito River channel, by reducing the likelihood that a temporary structure will have to be constructed to cross the river channel.

4.2.13.6 Construction Schedule and Operations

The restoration project will occur over a three-year period. It is anticipated that construction will start at 7 a.m. ~~sunrise~~ and end at ~~sunset~~7 p.m., Monday through ~~Saturday~~Friday. Construction during the weekend would occur from 9 a.m. to 7 p.m. on Saturdays. Conventional land-based construction is proposed to occur year round with special measures to be implemented to avoid nesting areas during the summer months. Where construction is proposed in proximity to nesting areas, all activity will be kept at least 100 feet (or as otherwise determined by the USFWS) from any active nesting areas. A qualified biological monitor will be on-site to monitor the construction with special attention given to the avoidance of impacts to rare, threatened, and endangered species. Dredging operations, if required, will be conducted 12 hours per day, six days per week until dredging is completed. Dredging operations may be temporarily suspended during the course of the week for routine maintenance, weather, and unforeseen mechanical problems.

The ultimate selection of construction equipment used on the site will depend on the availability of equipment to the contractor at the time of construction. A summary of the potential equipment that may be used is listed in Table 4.~~5~~6.

4.2.14 Villages Mitigation Bank

As illustrated in Table 4.~~4~~5, the Villages Mitigation Bank would have a temporary impact on a total of approximately ~~2.92~~6.~~3~~68 acres of wetlands and a permanent impact of ~~1.14~~1.29 acres. ~~No permanent loss of wetlands would occur.~~ At a ratio of 1:1 for temporary and permanent impacts, a total of ~~2.9~~3~~26.37.44~~7.97 acres of the ~~21~~ 20.77 acres of wetlands created in the Villages Mitigation Bank would be required to offset the ~~temporary~~ impacts. A 1:1 ratio is considered appropriate for permanent impacts in the VMB because the affected wetland is considered low quality and transitory in nature. This area became established in

2005 as a result of an unusually high rainfall year. Additionally, the affected wetland area is attributed to the following two wetland species which have expanded their range: seaside heliotrope and rabbit foot grass. The seaside heliotrope is located in patches in the expanded area. Although classified as an obligate wetland species, WRA indicates that the plant is known to occur in non-wetland areas. The rabbit foot grass is classified as a facultative wetland which indicates that it too can occur in non-wetland conditions. The rabbit foot grass also has a patchy distribution in the expanded wetland area. Thus, the Villages Mitigation Bank would have a surplus of approximately ~~18.08~~~~13.3~~12.8 ~~20.8~~ acres of wetland credits, in addition to any that would be provided in a Mitigation Bank Agreement for the enhancement of any existing wetlands within the Villages Mitigation Bank.

Table 4.~~4~~5. Summary of Net Wetland Habitat Creation – Villages Project Components

Habitat	***Restored Area (acres) A***	***Permanent Wetland Loss (acres) B***	***Mitigation for Permanent Wetland Loss (acres)[1] C***	***Converted Area (acres)[2] D***	***Net Wetland Habitat Creation (acres) (A-C)-D***
Tidal Wetland (below +4.5 feet, NGVD)					
Subtidal	0.00	0.00	0.00	0.00	0.00
Frequently Flooded Mudflats	0	0.00	0.00	0.00	0.00
Frequently Exposed Mudflats	~~5.80~~5.90	0.00	0.00	0.00	5.90
Low Coastal Salt Marsh	~~3.20~~3.60	0.00	0.00	0.00	3.60
Mid Coastal Salt Marsh	~~5.30~~4.83	0.00	0.00	0.00	4.83
High Coastal Salt Marsh	~~6.50~~6.30	0.00	0.00	0.00	6.30
Fresh and Brackish Water	0.00	~~0.00~~0.02	~~0.00~~0.02	0.~~70~~72	-0.~~08~~074
Total Tidal Wetland	~~20.8~~20.63	0.02~~0~~	~~0..00~~0.02	0.~~70~~72	19.839~~5~~
Nontidal Wetland (above +4.5 feet, NGVD)					
Seasonal Salt Marsh	0.00	~~0.00~~1.11	~~0.00~~1.29~~00~~	5.~~63~~96	-7.25~~5.91~~
Transitional Wetlands	~~0.20~~0.14	0.00	0.00	0.00	.14
Total Nontidal Wetland	0~~0.2~~0.14	~~0.00~~1.11	~~0.000~~01.29	5.~~63~~96	-7.11~~5.77~~
Total Wetland	**~~21.0~~20.77**	**~~0.09~~1.13**	**~~0.36~~1.31**	**6.~~33~~68**	**1~~4.08~~2.8**

1 Assumes 1:1 mitigation ratio for temporary wetland habitat.

2 Assumes ~~4~~1:1 mitigation ratio for permanently eliminated wetland habitat due low quality and transitory nature of the affected wetland.

Table 4.~~5~~6. Potential Construction Equipment Requirements

Item No.	Activity	Equipment	Workforce
1	Excavate Channel between Jimmy Durante Bridge and the ocean inlet. Haul and unload material onto adjacent beach.	Equipment Composition 2 – Hyd. Backhoes, wheel mtd. 3 – Dump trucks, 10-15 cy 1 – Mechanics truck	1 shift per day of operation 2 – Operators 3 – Teamsters 1 – Mechanic 6 – Laborers *Total labor force per day of production = 12*
2	Excavate new Channel between Jimmy Durante Bridge and the lagoon. Haul and unload material onto adjacent beach. Install rock slope protection.	Equipment Composition 2 – Hyd. Backhoes, wheel mtd. 7 – Dump trucks, 10-15 cy on M 4 – Dump trucks, 10-15 cy on T-F 1 – Front-end loader, 5 cy, half-day on M only. 1 – Crane w/bucket, 5 cy	1 shift per day of operation 4 – Operators 5 – Teamsters 6 – Laborers *Total labor force per day of production = 15*
3	Spread dumped beach fill material onto adjacent beach approx. half-mile up and down the coast.	Equipment Composition 1 – Bulldozer, 300 H.P. 1 – Survey truck	1 shift per day of operation 1 – Operators 4 – Survey Crew *Total labor force per day of production = 5*

Table 4.~~5~~6. Potential Construction Equipment Requirements

Item No.	Activity	Equipment	Workforce
4	Demolish misc. structures including underground structures. Crush concrete on-site and reuse as base for temporary haul roads and/or staging areas. Haul remainder off-site to Miramar Dump.	Equipment Composition 1 – Bulldozer, 300 H.P. 2 – Front-end loaders, 5-6 cy 2 – Excavators w/thumbs 7 – Dump trucks 1 – Mechanics truck 1 – Air pump for asbestos/hazmat removal 1 – Crusher operation	1 shift per day of operation 5 – Operators 7 – Teamsters 10 – Laborers 1 – Mechanic 6 – Laborers (Hazmat team) 2 – Laborers (Crusher operation) *Total labor force per day of production = 31*
5	Clear & grub site. Chip and mulch trees and vegetation to be reused and mixed w/topsoil.	Equipment Composition 1 – Bulldozer, 300 H.P. 2 – Front-end loaders, 5-6 cy 7 – Dump trucks 1 – Chipping machine 2 – Chain saws	1 shift per day of operation 3 – Operators 7 – Teamsters 10 – Laborers *Total labor force per day of production = 20*
6	Excavate and stockpile topsoil. Mix with mulch material. Redistribute and spread topsoil prior to revegetation.	Equipment Composition 3 – Self-propelled scrapers, 21 cy 1 – Bulldozer, 300 H.P. 1 – Motor grader 1 – Survey truck	2 shifts per day of operation 5 – Operators 3 – Laborers 4 – Survey crew *Total labor force per day of production = 24*

Table 4.~~5~~6. Potential Construction Equipment Requirements

Item No.	Activity	Equipment	Workforce
7	Excavate lagoon and marsh areas and construct river berm and nesting site cores. Includes installation of geotextile, culverts, and rock slope protection along river berm.	Equipment Composition 5 – Self-propelled scrapers 5 – Bulldozers, 300 H.P 6 – Hyd. Backhoes, 3 cy 6 – Off-road Haulers, 60 cy 1 – Crane, 5 ton 1 – Survey truck	2 shifts per day of operation 12 – Operators 10 – Laborers 6 – Teamsters 4 – Survey crew *Total labor force per day of production = 64*
8	Import sand cap material for nesting sites. Install chain link and chick fence. Labor includes raking and weeding nesting site prior to new season.	Equipment Composition 15 – Dump trucks 1 – Motor grader 1 – Survey truck 1 – Fence contractor truck	1 shift per day of operation 1 – Operator 15 – Teamsters 8 – Laborers 4 – Survey crew *Total labor force per day of production = 28*
9	Utility replacement of 8” sewer force-main. Jack pipeline under channel.	Equipment Composition 1 – Hyd. Backhoe, 3 cy 1 – Water pump w/hoses 1 – Drilling machine	1 shift per day of operation 3 – Operators 5 – Laborers 2 - Carpenters *Total labor force per day of production = 10*

Table 4.~~5~~6. Potential Construction Equipment Requirements

Item No.	*Activity*	*Equipment*	*Workforce*
10	Utility relocation of existing overhead (electric) poles.	Equipment Composition 1 – Bulldozer, 300 H.P. 2 – Dump trucks 2 – Chain saws	1 shift per day of operation 1 – Electrician 2 – Laborers 2 – Teamsters 1 – Operator *Total labor force per day of production = 6*
11	Construct weir (2) in channel to CDFG property.	Equipment Composition 1 – Crane, 40 ton 1 – Vibratory hammer 1 – Backhoe, 3 cy	1 shift per day of operation 3 – Operators 5 – Laborers *Total labor force per day of production = 8*
12	Revegetation of wetland plants impacted during construction. Includes salvage of existing pickleweed, temporary irrigation system(s), seeding, and monitoring.	Equipment Composition 2 – All-terrain vehicles 1 – Rototiller 1 – Spreader 1 – Roller	1 shift per day of operation 2 – Operators 1 – Skilled worker 4 – Laborers *Total labor force per day of production = 7*

Table 4.~~5~~6. Potential Construction Equipment Requirements

Item No.	*Activity*	*Equipment*	*Workforce*
13	Site access and yard setup. Includes haul roads, field office, temporary surfacing, and extending electric power and water to the site.	Equipment Composition 1 – Backhoe, 3 cy 1 – Welding machine 1 – Front-end loader, 5 cy 1 – Motor grader	2 shifts per day of operation 3 – Skilled workers 1 – Electrician 2 – Carpenters 6 – Laborers 3 – Operators 1 – Plumber 1 – Welder *Total labor force per day of production = 32*

Along the northern edge of DS32 and north of the Villages Mitigation Bank area, ~~The a~~ proposed drainage adjacent to Via De La Valle will collect~~s~~ run-off through the use of concrete brow ditches, grass lined swales and underground culverts. Due to the grading of ~~the disposal site~~DS32, the stormwater is conveyed by three systems. Two of the systems discharge at both the northeast and northwest corners of the proposed wetlands, directly south of ~~the disposal site~~DS32. Water quality structures are proposed within each of these systems ~~(not shown on the plans)~~ in order to protect the wetlands. The remaining system discharges directly into the river. The proposed storm drain system was designed to function with the existing conditions as well as accommodates the future Via De La Valle widening project.

4.3 PLANTING PROGRAM

4.3.1 Introduction

The restoration project will result in the creation of expanded wetland habitats within the San Dieguito Lagoon. The overall design has been developed to create a self-sustaining, natural tidal wetland ecosystem with associated upland habitat elements. In most cases, natural recruitment of native vegetation will be expected to provide the majority of plant recruitment to the restored habitats. It is anticipated that during the phased construction of the restoration, certain phases will be exposed to ocean waters sooner than others allowing for native plant seeds to spread to these areas. In addition, for the first year following construction, no planting of tidal wetland areas is planned in order to allow for the site to "equilibrate" and for areas of siltation and /or erosion to establish a more natural profile to the excavated basins. Control measures will be undertaken to limit weed establishment.

The permit conditions that relate to vegetation within the wetland restoration portion of the project require that:

> *Vegetation. The proportion of total vegetation cover and open space in the marsh shall be similar to those proportions found in the reference sites. The percent cover of algae shall be similar to the percent cover found in the reference sites.*
>
> *Spartina canopy architecture. The restored wetland shall have a canopy architecture that is similar in distribution to the reference sites, with an equivalent proportion of stems over 3 feet tall.*
>
> *Reproductive success. Certain plant species, as specified in the work program, shall have demonstrated reproduction, (i.e. seed set) at least once in three years.*
>
> *Exotics. The important functions of the wetland shall not be impaired by exotic species.*

The performance standards apply to those areas that are being restored to meet the Condition A of the Permit for SONGS. CCC staff has recommended that the areas that should be receiving credit towards Condition A are located below the 4.5 feet, NGVD contour. The CCC staff is responsible for undertaking the monitoring program within this area. However, at this time, no wetland reference sites have been designated nor any specific criteria as developed from those reference sites made available. Therefore, it is not possible to determine the exact species composition, density, or coverage that will be necessary to meet the performance standards.

Some data on the vegetation within the San Dieguito Lagoon has been collected by the CCC staff that can provide some guidance to the type of vegetation that is likely to colonize the new habitat areas. It is anticipated that with the development of natural conditions within the restoration that these criteria can be met over a period of time. For example, within Batiquitos Lagoon, coastal salt marsh vegetation expanded by natural recruitment by nearly 40 acres within three years following re-introduction of tidal action (Merkel and Associates *et al.* 1999). During the 1999 Batiquitos Lagoon monitoring, seventeen plant species were observed on permanent transects throughout the entire range of habitats within the coastal marsh including transition zone areas, seven of which were classified as salt marsh species. While some of the remaining ten species are non-native species that have become naturalized in coastal salt marshes, none are considered invasive species according to the California Exotic Pest Plant Council.

The planting program as described for this project is divided into habitat types. Those habitat types that are to be monitored by the CCC to assure compliance with Condition A of the CDP are low marsh, mid-marsh, and high marsh up to 4.5 feet, NGVD. Details of this planting program are provided in this submittal. Planting is also required in the EIR/EIS for elevations above 4.5 ft for the purposes of erosion control and disposal site stabilization.

4.3.2 Goal and Objectives

The overall goal for the planting program is to supplement the natural recruitment expected following grading and introduction of tidal action. The primary means to judge success of natural recruitment will be based on the restoration meeting the performance criteria outlined in the SONGS Permit conditions.

The specific objectives of the planting program are presented below.

- Encourage the establishment of plant cover as needed to meet the Permit conditions;
- Introduce species that have limited seed dispersal or may not be present or widespread in the lagoon at present (i.e., *Spartina*);
- Provide sufficient habitat to meet other performance requirements as contained within the Permit;
- Encourage native plant establishment to compete against invasive species;
- Promote the use of salvaged plant materials that may be impacted by the restoration and/or construction activities; and
- Meet additional sensitive plant establishment requirements as contained in the EIR/EIS.

4.3.3 Habitats Considered for Planting

As part of the restoration project tidal, non-tidal, and upland vegetated habitats would be established within the restored areas. The dominant plants expected within these communities and the species that may require planting are listed in Table 4.~~6~~7.

Table 4.~~6~~7. Dominant plant species expected within each habitat type and proposed method of achieving establishment

*Habitat type**	*Elevation (ft, NGVD)*	*Acres*	*Scientific name*	*Method of establishment*
Seasonal Salt Marsh	Non-tidal	9.47~~4.56~~	*Salicornia virginica*	Natural recruitment/transplanting fragments
Transitional Wetlands	Non-tidal	0.82~~0.64~~	*Native Herbs & Grasses*	Natural recruitment & Seed
Low coastal salt marsh	1.3 to 2.2	17.55~~18~~	*Spartina foliosa*	Plug plantings in small patches to allow for natural spread
Mid-coastal salt marsh	2.2 to 3.8	38.37~~9~~	*Salicornia virginica*	Natural recruitment
			Jaumea carnosa	Natural recruitment
			Batis maritima	Natural recruitment
			Salicornia subterminalis	Natural recruitment
High coastal salt marsh	3.8 to 4.5	21.93~~21~~	*Salicornia virginica*	Natural recruitment/transplanting fragments
			Salicornia subterminalis	Natural recruitment
			Monanthochloe littoralis	Natural recruitment
			Distichlis spicata	Natural recruitment
			Frankenia salina	Natural recruitment

* Note that there is some overlap of targeted species between habitat zones.
* This table includes both JPA and SCE components.

In addition to the species listed above, the EIR/EIS recommends the following general mitigation measure for impacts to non-listed, sensitive plant species:

> "Non-listed sensitive plant species shall be avoided to the maximum extent possible. Where impacts cannot be avoided, seed shall be salvaged from impacted plants and an attempt shall be made to reestablish populations in suitable habitat. Restoration efforts onsite shall use seed collected from the site, where feasible."

According to the EIR/EIS, most of the sensitive plant species that occur on the site are not expected to experience significant impacts since they are located outside of impact areas and can be avoided. Priority is given to avoidance of sensitive plant populations. However, if impacts to species cannot be avoided, mitigation measures to undertake experimental soil salvage, seed collection, and/or transplanting are recommended as described below:

- Southern tarplant: Tarplant was mapped in 1998 in scattered locations east of Interstate-5. In 2004, updated surveys were conducted which located and mapped 0.034 acre in an existing dirt road adjacent to the east side of Interstate-5. This road is within the proposed Coast to Crest trail alignment. If possible, the trail will be relocated slightly to avoid impacting these plants. If the trail cannot be moved, mitigation measures will be implemented. Topsoil along the entire trail alignment in the vicinity of the tarplant (seed source may be present in adjacent areas where plants were not observed in 2004) will be salvaged and stockpiled separately from other topsoils. These soils will be re-distributed in appropriate habitat areas after construction, which consist of relatively bare or disturbed areas along high marsh and seasonal wetland fringes or on margins of spoil disposal areas. Potential areas include margins of the mitigation wetland and upland disposal area DS32 (may also place a small amount in an area adjacent to JPA educational area as a demonstration plot). Depending on timing of construction, mature seed may also be collected and re-distributed to supplement salvaged soils. The plant was not observed in other previously mapped locations during 2004 and may no longer exist in these locations due to habitat alteration (most are in agricultural areas). However, these locations are either outside of the project and will not be impacted, or are already slated for topsoil salvage and stockpile as part of the overall topsoil salvage program. Therefore, additional measures to address these potential populations are not required.

- Red sand verbena: Sand verbena has been observed on a sand terrace adjacent to the north side of the San Dieguito River east of Camino del Mar. Plant material in impacted areas will be salvaged and held for re-planting, and a temporary construction fence and signage will be placed around the remaining population to protect it from the adjacent staging area. This approach will preserve some intact plants that could be used as a source for plant propagation in addition to transplanting salvaged individuals. After dredging is completed, soil in the staging area will be deconsolidated to a depth of 18" and salvaged verbena will be transplanted. The goal is to replace the same amount of area as was permanently impacted at a similar density to the existing population.

- Coulter's goldfields: Goldfields were mapped in two locations in 1998: in seasonal marsh on the south side of the lagoon and adjacent to the river overpass on the west side of Interstate-5. Goldfields were not observed in 2004 surveys. Both of these locations are outside of project areas; therefore, no direct impacts will occur. To avoid indirect impacts from an adjacent haul road and grading areas, a construction fence and signage will be placed around the location adjacent to I-5 using a 10-ft setback.

- Del Mar Mesa sand aster: The population was mapped in 1998 south of the river on low bluffs overlooking seasonal wetland to the east of Interstate-5. The aster was not observed during 2004 surveys. The location is not within the project area but is adjacent to the east to disposal site DS35. To avoid indirect impacts, construction fence and signage will be placed along the top of the bluff using a 10-ft set-back. In addition, silt fence will be placed at the base of the adjacent disposal site to prevent any loss of materials onto the bluffs which could degrade habitat conditions.

- Lewis's evening primrose: The primrose population is located approximately 30 feet up a bluff on the north side of the lagoon in an area that is outside of and non-adjacent to the project area. No direct or indirect impacts are expected; no action is proposed.

- Woolly seablite: Seablite is present in patches throughout high marsh, seasonal marsh, and saline habitats on the site, where it grows with pickleweed. Because existing pickleweed within the project area is already slated for salvage and redistribution in created high marsh areas and the seasonal mitigation wetland, seablite will be salvaged along with pickleweed and redistributed in appropriate habitats. No additional actions are needed to reestablish this species on-site.

These mitigation measures are recommended for project impacts identified under the current plan. Should the project be altered in the future, some of these proposed measures may no longer be necessary, or may need to be redesigned to be appropriate.

4.3.4 Planting Program Description

Detailed plans and specifications for the planting program will be developed with the construction plans. The specific plan will be based on the scientific literature (see Zedler et al. 2000) and the experience of local native nursery operators. Planting efforts like those at Batiquitos Lagoon and the Model Marsh at Tijuana Estuary will also be studied for successful methods that can be applied at San Dieguito.

The purpose of this section is to outline the method(s) that would be used for establishing the selected plant communities/species as listed in Table 4.~~6~~7.

4.3.4.1 Low coastal salt marsh

The only species presently within the low coastal salt marsh is *Spartina foliosa*. This species is currently found within the lagoon on the north side of the DFG parcel. This colony was planted by Dr. Joy Zedler in the mid-1980's. It is anticipated that it could be transplanted throughout the lagoon by taking sprigs (ie. rhizome segments with above ground shoots) from existing colonies and transplanting them in newly constructed areas.

The transplanting would be done in the late winter/early spring months. Transplants would be planted into small plots within the upper 0.5' of the target elevation range for this species. Transplants would be planted in approximately 50% of the surface area within this elevation range. Sprigs would be planted on 2-foot centers. We estimated that this corresponds to approximately 75 to 100 planting plots, which would vary in size from 750 sq. ft. to 10,000 sq. ft. No soil amendments are anticipated for this species. It is anticipated that the small plots will then spread throughout the restoration site at appropriate elevations as has occurred at the Batiquitos Lagoon site.

Approximately 14,000 plants will be required. Because there are insufficient plants within the lagoon to supply this amount, a nursery may need to be contracted to collect seeds or plants and produce the required quantity of plants.

Because of the large number of plants required, a multi-year planting program may be implemented to facilitate the logistics these quantities. The project may also collect Spartina from a local lagoon in the region. Appropriate collection permits will be obtained from the Department of Fish and Game. Batiquitos Lagoon is considered the best collection site. Alternative collection sites will be identified if required.

4.3.4.2 Mid-coastal salt marsh

No planting is anticipated in this area as natural recruitment should be sufficient to meet the performance criteria. *Salicornia virginica* will be the primary species to colonize this area. If performance criteria are not being met within two years after construction is completed, planting will be undertaken using nursery grown stock.

4.3.4.3 High coastal salt marsh

The high coastal marsh will also experience some recruitment by native species. However, given the infrequent flooding by high tides, it is also likely that natural recolonization will occur more slowly than within the mid-marsh. Therefore, a transplanting program will be undertaken using plant material salvaged during construction. *Salicornia* species are the primary candidates for salvage and transplanting.

Prior to construction, all impact areas that support pickleweed that are suitable for transplanting will be located. At this time, approximately 15 acres of wetland vegetation will be affected by the project. Most of this is *Salicornia*. Some of this plant material will be used within the seasonal wetland mitigation sites and transition zone areas. Approximately 23 acres of high marsh habitat will be created under this plan.

The method of transplanting will be selected based on the logistical opportunities and constraints of the site and contractors equipment and expertise. The following are examples of two possible alternatives.

Alternative A

1. Locate and mark donor plots generally free of invasive and weedy species.
2. Excavate donor plants and soil material with front-loader.
3. Transfer donor plant and soil material to holding area; holding areas may include subsequent phases of construction to minimize impacts to areas outside the construction footprint.

4. Maintain donor plant material, if feasible, until ready for placement in newly created habitat; irrigation or maintenance of saturated soils using brackish water will be undertaken as needed.
5. Prior to planting, cut plant materials into 4 inch fragments. Apply fragments to the soil surface and disc into the soil surface to promote plant surface/soil contact.

Alternative B

1. Locate and mark donor plots generally free of invasive and weedy species.
2. Strip and stockpile top 4" of topsoil/pickleweed from designated area.
3. Place 2" of topsoil/pickle weed in high marsh and seasonal salt marsh areas.
4. Develop specifications for managing the stock pile and limiting storage times to ensure the survival of plant material.

4.3.5 Additional Issues to be Considered in Final Engineering Phase

The FRP presents an overview of the program to be implemented for meeting SCE's Permit requirements. Detailed planning will be completed prior to bid specifications. The following issues related to the planting program will be examined in more detail.

- *Re-use of topsoil from the project site.* Suitable donor locations will need to be identified, soils analyzed, and a stockpiling plan developed to store and distribute top soils to appropriate restoration areas.
- *Soil testing and amendments.* Top soils and soils remaining in place after restoration will need to be tested and evaluated for use of soil amendments to adjust salinity, pH, and organic matter to appropriate levels for the projected plant community.
- *Weed control.* Weed seed banks within salvaged soils and weed control methods for exposed soils will need to be specified.
- *Sources of plants.* Locations for all salvaged plants on-site will need to be determined as well as off-site locations for plant material to be established by seed or propagules.
- *Plant quantities*. Final spacing and plant quantities will be developed from the final grading plans.
- *Phasing.* The planting program, timing of planting, and location of storage/transplanting areas will need to be developed with the construction phasing.
- *Rare plant establishment*. Experimental procedures may need to be developed separately from the overall planting program for some of the more rare species on-site. These species will not have any specific performance criteria.

4.4 ASSESSMENT OF SIGNIFICANT IMPACTS

The potential impacts associated with project implementation were assessed by the USFWS and JPA during the environmental review process. The results are presented in Table 4.~~7~~8, which was taken from the FEIR/FEIS document (JPA/USFWS, 2000). Mitigation measures that were developed for unavoidable, adverse significant impacts are presented in Table 4.~~7~~ 8 for each potentially significant impact.

4.5 ASSESSMENT OF NET HABITAT BENEFITS

The restoration project will produce substantial net habitat benefits primarily through the creation and substantial restoration of tidal wetlands habitat with minimal impact to existing wetlands. The tidal inlet will be maintained in an essentially open condition in perpetuity to improve estuarine water quality, thereby enhancing aquatic functions for existing, created, and substantially restored habitat. JPA has entered into an agreement with SCE that would provide the legal and financial guarantees necessary to ensure that the inlet will be maintained and in an open condition in perpetuity and the restoration wetland will continue to attain biological benefits. A large area of tidal wetlands habitat will be created and substantially restored, which will benefit a large number of native species including threatened and endangered species (e.g., California least tern, western snowy plover, and Belding's savannah sparrow). The restoration project will provide the following additional habitat benefits.

- Increased acreage of tidal habitats with beneficial impacts on associated species.
- Improved functions and values of existing tidal habitats with beneficial impacts on associated species.
- Enhanced functions and values of seasonal wetlands with beneficial impacts on associated species.
- Restoration of native upland habitats with beneficial impacts on associated species.
- Creation of nesting sites will benefit California least tern, Western snowy plover, and other waterbirds contributing to the restoration of ecosystem functions and values.

Any impacts to existing wetlands habitat will be mitigated through creation and restoration of additional wetlands habitat at an appropriate ratio. Since the restoration project will create or substantially restore tidal wetlands, maintain an open tidal inlet, mitigate any impacts to existing wetlands habitat, restore native upland habitat, create four nesting sites, and return land to public agencies, a significant increase in net habitat benefits will be achieved through project implementation.

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Table 4.~~7~~8. Assessment of Significant Impacts

Resource	Significant Impact	Mitigation Measure	Significance After Mitigation
Land Use	Use of SA3 and the access road leading to this construction staging area could be incompatible with residences along Racetrack View Drive.	SA3 is no longer proposed. Construction access is no longer proposed at this location. A permanent access road would be required to provide for periodic maintenance of the nesting site. However, vehicular use of this road would be minimal.	Less than significant
	Excavation/construction west of I-5, inlet dredging, and maintenance dredging would produce temporary noise and night lighting impacts on residential areas along Sandy Lane. Additionally, periodic disruption of beach use would occur during maintenance dredging.	A public outreach/public comment program shall be developed by the applicant and approved by the appropriate affected agencies (City of Del Mar, City of San Diego, CCC, JPA).	Less than significant
	Crossing the river mouth on foot would become relatively more difficult most of the time and prevented at some periods, particularly during high tides.	Prior to the approval of discretionary permits required for the project from the City of Del Mar, the applicant shall prepare, to the satisfaction of the City of Del Mar, a design for ~~a pedestrian~~improved ~~-~~access ~~way~~ along the south side of the inlet channel that would accommodate access to Camino Del Mar. In addition, the applicant shall also agree to fund and construct said ~~pathway~~ improvements prior to opening the inlet channel. If based on additional design work, the City of Del Mar determines that the pathway is in fact technically infeasible, an alternative access way to Camino Del Mar shall be considered.	Less than significant if technically feasible to construct the pathway in a timely manner.

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
	If either DS37 or DS38 were used as disposal sites during peak times, such as the fair or racing season, disposal activities could conflict with activities at these sites.	Disposal sites D37 and D38 ~~s~~are no longer proposed.~~hall not be used during peak times such as the Del Mar fair or racing season.~~	~~Less than significant~~NA
Land Use ~~Hydrology/ Water Quality~~	The Coast to Crest Trail could conflict with use of the 22nd District Agricultural Association's seasonal parking lot and Surf and Turf golf driving range.	A 6-foot-high net shall be provided north of the trail outside of the floodway between the driving range and the trail to protect trail users from golf balls that may still be rolling at this point. A lodgepole or post and cable fence shall be provided between the trail and the District's parking areas. The final trail design and alignment shall be coordinated with the District in order to minimize potential conflicts.	Less than significant
	The preferred alignment for the Coast to Crest Trail east of the Via de la Valle property is to travel along the north side of the San Dieguito River near the southern end of the Horsepark property. This alignment could result in potentially significant land use conflicts between the existing equestrian operation and public trail uses.	Prior to construction of the Coast to Crest Trail, the JPA shall coordinate the trail alignment with the District to ensure that use conflicts have been minimized. Measures such as the installation of fences, gates, and possibly vegetative screening shall be considered and District staff shall be consulted to determine the best alignment for the trail through the Horsepark facility.	Less than significant
	Land use compatibility impacts to residential areas located to the north of the site across Via de la Valle could occur if public address systems are used and/or if night lighting is visible.	Implement mitigation measures described for noise and visual resources below.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
	Use of a tram on the proposed trail system during the Del Mar fair could cause conflicts with bicyclists, hikers, equestrians, and other users. The tram could cause safety impacts, as well as a diminishment of the overall recreational experience.	~~No feasible mitigation measures have been identified~~Use of a tram is no longer proposed.	NA~~Significant~~
Hydrology/ Water Quality	Construction could result in: ▪ Spills or leaks of oils or fluids onto ground and into aquifer or wetlands; ▪ Potential for increased channel and river bottom scour; • Short-term impacts to water quality (e.g., increased turbidity) during dredging, berm and nesting site construction, and upland disposal.	The contractor shall attend a pre-construction meeting to review all required environmental mitigation measures prior to the commencement of any construction activity. Prior to the utilization of any construction staging areas, temporary berms/cofferdams shall be constructed around the staging areas to prevent the transport of spilled materials into adjacent waterways. The contractor shall take all appropriate precautions to avoid spillage or leakage of hazardous materials, such as petroleum products, all fueling and maintenance of construction vehicles shall occur either off-site or be limited to the designated staging areas. The contractor shall be responsible for removing and properly disposing of any hazardous materials that are brought onto the construction site as a result of construction activity and/or removing and properly disposing of any soils that become contaminated during the construction process through spillage or leakage. All such contaminated areas shall be cleaned up prior to preparing the construction site and temporary construction staging areas for revegetation. The contractor shall prepare, submit to the JPA and any other designated agencies for review and approval, and follow the recommendations of a spill prevention and contingency plan.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Hydrology/ Water Quality	(Impacts continued from previous page)	The contractor shall construct additional temporary berms around fuel storage areas that shall be maintained for the full time during which construction is occurring and construction equipment is present on the site, and all fuel storage areas shall be confined to designated construction staging areas. The contractor shall construct berms or erect silt curtains around areas being excavated/graded to reduce soil losses to waterways. The contractor shall control fugitive dust emissions through watering or other accepted standard methods of control. Water quality monitoring shall be implemented for the following: • Monitor the dewatering effluent to demonstrate that the effluent quality has achieved the appropriate receiving water criteria. Construction may be halted if effluent levels are not within established criteria. • Conduct water quality monitoring during dredging/construction activities; if monitoring results indicate excessive impacts (e.g., depressed dissolved oxygen concentrations), modifications to construction or sediment disposal methods to lessen the magnitude of the impacts shall be developed and implemented in consultation with the appropriate permitting agencies. All designated fill slopes shall be hydroseeded and landscaped within 30 days of completion of grading activities.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Hydrology/ Water Quality ~~Hydrology/ Water Quality~~	(Impacts continued from previous page)	Incorporate various engineered erosion control measures into the project design. Temporary sedimentation and desilting basins, to be located between graded areas and adjoining wetlands shall be constructed and maintained until the potential for erosion of graded areas has been minimized through the successful establishment of erosion control landscaping.	Less than significant
	Public use of the proposed trails may result in greater amounts of trash, debris, and wastes from domestic animals (e.g., horses). Runoff containing these materials could adversely impact surface water quality.	Expand the JPA's current trail maintenance program to cover the trails located within the current project area. This maintenance program shall include the requirement to perform regular trail maintenance, including manure and trash removal from and around the trail. Trail tread maintenance intended to avoid erosion problems on natural soil surfaced trails shall occur on as-needed basis. The maintenance program shall include a monitoring component that will determine when and how often trail cleanup should occur. This could result in more frequent maintenance, but under no circumstances shall trail cleanup occur less than once ever two weeks.	Less than significant
	The use of area U18 for multiple uses, including equestrian uses and seasonal parking, could result in greater amounts of trash, debris, and wastes from domestic animals (e.g., horses) than under existing conditions. Runoff containing these materials could adversely impact surface water quality.	U18 would not be implemented as part of this FRP.	~~Less than significant~~NA

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Geology/ Soils ~~Biological Resources~~	Grading of construction staging areas, access areas, disposal sites, and public access areas could result in erosion and associated short-term water quality impacts. Erosion of graded slopes at disposal sites could result in potential long-term water quality impacts.	Implement standard short-term erosion control features during grading and construction of permanent erosion control features on slopes of disposal sites.	Less than significant
	Seismically induced ground shaking could result in liquefaction, differential settlement, and lateral spreading, including potential slope failure of berms, nesting sites, freeway embankments, and disposal sites.	Site-specific geotechnical investigations shall be completed in areas proposed to receive fills, including berm areas, nesting sites, public access areas, and disposal sites.	Less than significant
	Overexcavation of area W1 could result in potential slope instability of the adjacent freeway embankment.	A geotechnical investigation shall be completed to determine appropriate slope stability measures.	Less than significant
	Post-construction shrinkage of soil could result in differential settlement and distress of structure foundations.	Dewatering of soils shall be completed prior to sediment placement to allow pre-construction shrinkage of soils.	Less than significant
	Natural corrosivity of on-site soils could result in corrosion of future ferrous metal structures.	Heavy-gauge, corrosion protected, steel drainage pipes/culverts or plastic pipe shall be utilized in the berms.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	*Significant Impact*	*Mitigation Measure*	*Significance After Mitigation*
Biological Resources	Precise elevation controls are necessary to ensure that habitats are graded to design specifications and provide the intended functions and values.	Survey benchmarks shall be established prior to construction and surveyed during construction to ensure that elevations are achieved within a tolerance of +/- 0.25 ft.	Less than significant
	If least terns, snowy plovers, or other water birds were to nest on NS15 in the future, use of the access road and staging area SA3 could affect their reproductive success and risk injury to the birds.	Staging area SA3 is no longer proposed. ~~No staging area is proposed in the vicinity of NS15.~~ In addition, all construction activities within 100 feet (or as otherwise determined by the USFWS) of any California least tern or western snowy plover breeding habitat shall not resume or begin until a qualified, USFWS approved biologist determines that breeding is not taking place. If California least terns or western snowy plovers are breeding, all construction activities within 100 feet (or as otherwise determined by the USFWS) of the active breeding sites shall be postponed until breeding activities have finished (approximately September 15 or as otherwise determined by surveys and the USFWS).	Less than significant
	Potential impacts of staging areas and haul routes include the removal of existing vegetation, disruption of wildlife use — including possible nesting on NS15 — alteration of soil and drainage characteristics, and construction-related spills. Although the project commits to restoration of these areas, plans to accomplish this are only generally developed. Final details should be addressed during permitting for the project. Impacts are considered potentially significant but mitigable by confining ground disturbance, parking, and maintenance/ refueling activities to areas that are of lowest value to wildlife and can most easily be restored following	Proposed construction staging areas and haul routes shall be located within the footprint of marsh restoration and the overlap of existing wetlands minimized wherever possible. To achieve this, the following modifications to proposed staging areas and haul routes shall be incorporated into the final grading plans: The haul route that passes east-west under I-5 shall be located as far to the south as possible to avoid the population of Coulter's goldfields on the west side of the bridge and the existing tidal channel east of the bridge. The haul route ~~and water control structure on the southwest side of I-5~~ shall be placed in ruderal habitat on the berm west of the bridge.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	*Significant Impact*	*Mitigation Measure*	*Significance After Mitigation*
	construction, and by avoiding the use of areas where sensitive bird species are nesting.		
Biological Resources	The water control structure for haul route to DS38 would temporarily disrupt tidal flows and constrict the area of passage for aquatic organisms. Frequent use of the structure by trucks hauling sediment to DS38 would also disturb fish and wildlife in the vicinity.	DS38 is not proposed as part of this FRP.	N/A
		Prior to construction, the boundaries of staging areas and haul routes shall be flagged by a qualified biologist. In addition, a biological monitor shall be present during the pre-construction meeting and during initial grading of these areas to ensure that no construction activity occurs outside of the designated construction boundaries.	Less than significant
		All sensitive biological areas within the project site but outside the restoration footprint shall be delineated on construction plans and flagged in the field in order to avoid any impacts to special status plants or habitats.	
		Prior to any construction-related disturbances, all construction personnel shall attend an environmental training session that shall discuss the sensitive resources in the project area and the mitigation measures designed to protect them.	
		All haul roads and construction staging areas shall be restored to pre-disturbance construction conditions following completion of construction.	

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Biological Resource	(Impacts continued from previous page)	No excavation shall occur at the river mouth until a fenced access way has been installed to direct beach users around the construction and down to the beach. This fencing would ensure that vegetated foredunes and coastal bluff scrub would not be impacted by beach users looking for an alternate route to the beach.	Less than significant
		All vehicles and construction equipment shall be parked, and equipment refueling and maintenance shall take place only in designated areas where potential spills of fuel, lubricants, or coolants can be contained and cleaned up without impacts on adjacent wetland and aquatic habitats. ~~The proposed bridge and temporary water control structure needed to accommodate the haul road proposed to cross I-5 shall incorporate gates or culverts that can be opened and closed temporarily, enabling tidal and river flows to pass through the structure during periods when water control is not needed but the bridge must be left in place for use as a haul route.~~	
	Beach disposal could adversely impact grunion spawning or the survival of eggs and larvae from previous spawns.	Beach disposal shall not occur during the high tide spawning and hatching periods of the California grunion, as predicted by the CDFG.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Biological Resource	Destruction of jurisdictional wetlands that are converted to uplands through use of disposal site DS38.	DS38 is not a part of this FRP.	~~Significant unless sufficient mitigation acreage were provided~~NA
	A portion of the trail alignment (up to 2 acres) would require the conversion of wetlands to non-wetland trail use.	The restoration plan would include ~~0.20~~8.52 acres of wetlands to provide a mitigation ratio of 4:1 for the approximate ~~0.05~~1.02~~07~~ acres of wetlands that would be permanently impacted by trail construction.	Less than significant
	If inlet maintenance ceases, populations of tidal marsh plants, invertebrates, fish, and wildlife that become established in the restored, fully tidal system could be adversely affected by inlet closure and the resulting deterioration of water quality.	Prior to the approval of the San Dieguito Wetland Restoration project by the JPA, the JPA shall enter into an agreement with SCE that would provide the legal and financial guarantees necessary to ensure that the inlet will be maintained in an open condition in perpetuity and the restored wetland will continue to attain the biological benefits described in Section 4.5.	Less than significant
	Areas near the river mouth would be disturbed during wetland construction and subjected intermittently to disturbance in conjunction with inlet maintenance. Disturbance would include both the direct effects of equipment operation and the indirect effects of redirected foot traffic.	Impacts on these sensitive habitats are potentially significant but mitigable by confining activities to areas of lowest biological value and providing public access along pre-existing trails where native vegetation would not be impacted.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Biological Resources	A significant increase in the turbidity of the water associated with construction may temporarily reduce foraging success of terns using the lagoon area during the construction period. The disruption of least tern foraging or breeding activities would be a significant impact that could be mitigated by the avoidance of construction activities within 500 feet of nesting birds, and the installation of sediment fencing around work areas and other erosion control measures (described under the water quality mitigation section) to control erosion and limit turbidity.	See Hydrology/Water Quality above.	Less than significant
	If breeding on the site occurred during construction, least Bell's vireo could be adversely affected.	Least Bell's vireo presence/absence surveys shall be conducted in the spring by a qualified, USFWS approved biologist. Surveys shall take place in the riparian habitat in the southeastern part of the property prior to the commencement of any activities within 500 feet of that area. If this species is present during its breeding season, grading and other intense activity associated with habitat restoration within 200 feet, or as otherwise determined by the USFWS, of the breeding habitat shall be scheduled to occur outside the least Bell's vireo breeding season (approximately March 15 through September).	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Biological Resources	Possible disturbance of Belding's savannah sparrow during nesting season.	Belding's savannah sparrow presence/absence surveys shall be conducted in the spring by a qualified, USFWS approved biologist in all suitable habitat within the project area. Construction staging, excavation, dredging, disposal sites use, and berm creation shall be scheduled to occur outside the breeding season for Belding's savannah sparrow (March 1 to August 1) for all activities that would occur in or within 100 feet of habitat known to support Belding's savannah sparrow breeding. Obtain CDFG incidental take permit as required.	Less than significant
	Predation on least tern or snowy plover nests could be increased, or nesting could be discouraged, by fences, structures, bushes, or public access that is too close to the nest sites.	California least tern and western snowy plover breeding habitat created onsite shall include the following characteristics: • The nesting sites shall be monitored to address fencing and potential predation issues. If least terns begin using the nesting sites, the nesting attempts shall be monitored to determine if predation is a problem, and if so, whether it is mammalian or avian in origin, and appropriate measures shall be taken to eliminate any future predation. • Large shrubs or man-made structures that could be used as perches by predators shall not be allowed on the berms near the nest sites. • Fencing shall not be installed initially around the nesting sites west of the highway, and shall be based on monitoring studies on the incidence of predators following construction.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Biological Resources	(Impacts continued from previous page)	• The nesting sites shall be monitored to address fencing and potential predation issues. If least terns begin using the nesting sites, the nesting attempts shall be monitored to determine if predation is a problem, and if so, whether it is mammalian or avian in origin.	
		If the use of fencing is unavoidable (to exclude mammalian predators), the following measures shall be required as part of the fence installation: fencing shall be installed at the base of elevated breeding habitat or if there is no elevation difference, at a distance to eliminate vantage sites for avian predators; materials that are mechanical deterrents to perching shall be installed on top of the fence. If these measures do not solve the problem, additional measures shall be used, such as protection of individual nests, and trapping and relocation of problem predator birds.	Less than significant
		Public access points (trails or lookouts) shall not be constructed within 100 feet of any tern nest site. Trails or access points shall be temporarily closed if terns nest within that distance.	
	Possible elimination of local populations of non-listed sensitive plant species (southern tarplant, Coulter's goldfields, Del Mar sand aster, woolly seablite) if restoration activities cannot avoid sites supporting them.	Non-listed, sensitive plant species shall be avoided to the maximum extent possible. Where impacts cannot be avoided, seed shall be salvaged from impacted plants and an attempt shall be made to reestablish populations in suitable habitat. Restoration efforts onsite shall use seed collected from the site, where feasible.	

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	Significant Impact	Mitigation Measure	Significance After Mitigation
Biological Resources	(Impacts continued from previous page)	A habitat restoration and monitoring plan, including success criteria that recognize the experimental nature of such transplantation, shall be prepared for any reestablishment effort. This plan shall include the following details for sensitive plant species: • Restoration efforts shall plan to establish the Southern tarplant populations on spoil disposal areas, as this species appears tolerant of saline compacted soils. The species shall be included in the proposed seed and plant mix for use in freshwater marsh transitional vegetation. In order to obtain viable seed, the plants shall not be impacted until the seed has been allowed to mature. • Restoration efforts shall plan to establish the Coulter's Goldfields populations in areas of salt marsh playas and fringing areas that receive seasonal rainwater flushing that reduces soil salinity. The species shall be included in the proposed seed and plant mix for use in upland restoration of the site. In order to obtain viable seed, the plants shall not be impacted until the seed has been allowed to mature. • Impacts to the red sand-verbena colony onsite would be considered locally significant and therefore, the area occupied by the red sand-verbena shall be fenced to prevent inadvertent impacts to these plants and their habitat.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Biological Resources	(Impacts continued from previous page)	• If individual Lewis's evening primrose plants are impacted, this species shall be included in the proposed seed and plant mix for use in similar habitat on conserved lands; seed shall be collected from Peñasquitos Lagoon, which supports the only large population in the County. • If individual Del Mar Mesa sand aster plants are impacted, this species shall be included in the proposed seed and plant mix to reestablish the plant on a nearby site on suitable habitat containing sandstone. Seed collection from existing plants on site shall occur to support the inclusion of local genotypes of this species in the revegetation seed and plant mix for coastal sage scrub and chaparral. • Where larger populations of woolly seablite (Suaeda) cannot be avoided, plants shall be salvaged for propagation or transplanted into a suitable protected location.	
	Disruption of breeding by sensitive non-listed bird species.	To avoid impacts to sensitive bird species that potentially nest in the upland habitat within the project boundaries (including California Species of Special Concern species such as loggerhead shrike, burrowing owl, and northern harrier), surveys shall be conducted by a qualified biologist during the appropriate breeding season for each species. Survey results will determine the need for construction setbacks from nests to reduce impacts to breeding success.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	Significant Impact	Mitigation Measure	Significance After Mitigation
Biological Resources	Destruction of burrows occupied by burrowing owls.	If burrowing owl burrows are disturbed during construction activities suitable (burrow) habitat shall be created. Any impact to occupied burrowing owl burrows would be considered locally significant and shall require the creation of artificial burrows in suitable habitat that is destined for long-term preservation. Burrowing owls shall either be passively relocated or captured and released at the preserved site. Relocation shall occur in the non-breeding season to avoid impacts to eggs, nestlings, or dependent juveniles.	Less than significant
	Disruption of nesting by sensitive riparian bird species.	To avoid impacts to sensitive bird species that potentially nest in the riparian or wetland habitat within or near the project boundaries (including California Species of Special Concern species such as yellow-breasted chat, Cooper's hawk, and tricolored blackbird and Fully Protected species such as the white-tailed kite), surveys shall be conducted by a qualified biologist during the appropriate breeding season for each species. All initial disturbances to riparian or wetland vegetation within 250 feet of known breeding sites for these species shall occur prior to February 15 or after July 15.	Less than significant
	Mortality to sensitive (non-listed) wildlife species during construction.	All wildlife in harm's way during construction, including individual southwestern pond turtles, shall be collected and relocated to suitable habitat by a biological monitor.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Biological Resources	Use of DS32 would result in the loss of 43 acres of Prime Farmland. The use of DS33, DS34, and DS35~~ and construction of the 25-car parking lot~~ would impact about 45 acres of land that are under cultivation and about 34 acres of land classified as Farmland of Statewide Importance. The use of offsite disposal area DS36 would displace 24 acres of land that are under cultivation and 26 acres that are classified as Farmland of Statewide Importance.	No feasible measures have been identified. It is only through the selection of an array of disposal site options that do not include DS32, DS33, DS34, DS35, and DS36 that the impacts to important farmland at these sites would be avoided.	Significant
Natural Resources	The filling of DS32, DS33, DS34, DS35, DS36, and DS38 would result in a significant impact to natural landforms (Landform Alteration).	Impacts associated with landform alteration are only mitigable through a redesign of the project to reduce the amount of fill relocated to any one spot within the project boundaries or by eliminating one or more of the disposal sites from the list of potential options. Unless redesigned or eliminated, the grading proposed at disposal sites DS32, DS33, DS34, DS35, and DS36 would be considered significant and unmitigated. As directed by the City of San Diego, the disposal sites have been designed to mimic the underlying natural landform and utilize contour grading techniques to the maximum extent practicable. The fill slopes have been designed with contour grading to integrate with the surrounding natural slopes.~~-~~ DS38 is not included in this FRP.	Less than significant if project is redesigned

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Landform Alteration/ Visual Quality	If the parking lot at DS37 were not landscaped in association with resurfacing following disposal, the expanse of asphalt that would be used to resurface the site would be more noticeable from the roadway than that which currently exists (Visual Quality).	DS37 is not included in this FRP.	~~Less than significant~~NA
	The stone revetment along the toe of the longest berm (in Area B8) and Stone Revetments 1 (now 2) and 2 (now 3) would cause an adverse visual impact (Visual Quality).	Those rocks that would be exposed and visible to the public in Stone Revetments 2, and 3 shall be of a color that will blend in with the natural color of the soils in the area.	Less than significant
	The articulated concrete block (ACB) mats above the stone revetment for berm B8 would cause an adverse visual impact (Visual Quality).	The ACB mats and the surrounding area shall be revegetated, and monitored by the CCC in accordance with permit conditions.	Less than significant
	When considered as a separate project element, all three berms would result in an adverse impact to landforms due to their height and the amount of fill required (Landform Alteration).	It is not feasible from a hydrologic perspective to reduce the amount of grading required to construct the proposed berms.	Significant
	Nesting sites NS11, NS12, and NS14 would require more than 2,000 cubic yards of earth and sand per acre and would have an elevation more than 10 feet above the finished grade (Landform Alteration).	No feasible mitigation measures have been identified.	Significant
	The light-colored plateaus of the new nesting sites (excluding NS15) would contrast noticeably with the surrounding area, particularly when seen from higher elevations (Visual Quality).	No feasible mitigation measures have been identified.	Significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Landform Alteration/ Visual Quality	Earthmoving/construction activities would have an adverse visual impact for between 2 and 4 years until the vegetation is established (Visual Quality).	No feasible mitigation measures have been identified to reduce impacts during this time period.	Significant
	The Nature/Interpretive Center would be visually compatible with the adjacent commercial development, but would restrict views of the river valley from a portion of Via de la Valle (Visual Quality).	Construction of the Nature/Interpretive Center is not a part of this FRP.	NA
	The use of area U18 for temporary parking, truck trailer storage, show barns and/or practice tracks, and/or uncovered show rings also could block some or all of the views of the river valley from Via de la Valle (Visual Quality).	Implementation of U18 is not a part of this FRP.	NA
Traffic/ Circulation	During construction periods of heavy truck traffic, in combination with periods of seasonal traffic congestion in the region (during the Del Mar Fair, thoroughbred racing season, or high summer beach use), the project could increase traffic congestion to significant levels within roadways adjacent to the site.	A~~Implement a~~ traffic management plan ~~that~~ has been developed to ~~would~~ minimize project-generated truck traffic on roadways adjacent to the site during peak seasonal traffic periods. The traffic plan ~~shall also~~ includes measures to accommodate the movement of trucks to and from the project site during periods of intense truck activity, such as using flagmen and installing warning signs to notify motorists of the presence of truck activity. Truck traffic, during the construction phases, will utilize internal temporary haul roads within the project site on rather than the surrounding roadways.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Traffic/ Circulation	Construction of the Coast to Crest Trail from I-5 west to Jimmy Durante Boulevard could significantly reduce the number of parking spaces (up to 150) in the District-owned dirt parking lot located south and east of Jimmy Durante Boulevard during high volume Del Mar Fair days.	The Plan Implementation section of the Master Park Plan for the lagoon area shall include the following requirements: (1) The JPA shall work with the District to refine the current alignment for the Coast to Crest Trail in the area west of I-5 in order to minimize the loss of parking spaces along the southern edge of the parking lot; and (2) the JPA shall work with the District to develop a contingency parking plan for days of very high attendance that could involve permitting parking on the trail, where feasible, and use of the 60 space parking lot at the proposed visitor/interpretive center.	Less than significant
	Future use of area U18 for purposes other than open space and the extension of the Coast to Crest Trail could generate potentially significant levels of traffic.	Implementation of U18 is not a part of this FRP.	NA
Air Quality	Phases 1/2 construction would exceed the NO_x emissions threshold of 50 tons per year.	Implement two-degree injection timing retard on diesel-powered equipment.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Public Health/ Public Safety	The number of aquatic mishaps at the inlet channel as it crosses the beach may increase since the channel would be wider than at present (most of the time), more of the channel would be at a constant depth, and a strong tidal inlet current would occur more regularly than at present.	The possible increase in the number of aquatic mishaps in the inlet area would be mitigated by staffing the temporary lifeguard tower at the inlet area on a more regular basis and providing an alternate public access route around the inlet via the pedestrian pathway along the Camino Del Mar Bridge. Specifically, there will be an improved pedestrian pathway south and north of the inlet channel. A ramp will be constructed north of the inlet channel to provide ADA access to the beach from Camino Del Mar. In addition, the wood pilings located just west of the Camino Del Mar Bridge will be removed by the applicant. This will eliminate a secondary hazard source for swimmers and waders caught in strong currents. To ensure appropriate lifeguard staffing, the applicant shall provide to the City of Del Mar as a condition of the Coastal Development Permit and required permits from the City of Del Mar, the funds necessary to staff two additional seasonal lifeguards for the initial two years following project completion. In addition, the applicant would be required to post a bond (the amount to be determined by the City of Del Mar) to cover additional staffing in future years. The exact level of staffing required to address long-term project-related mishaps in the inlet area would be determined as a result of the monitoring program described below. The issue of an alternate public access route is addressed in section 4.1 of this document. In this report, current estimates are based on modeling results, which have inherent levels of error, and the inlet channel depth estimate (-2 NGVD) is based on design inputs. The actual currents introduced by this project may be somewhat less or greater than these estimates. As stated above, actual channel depths may vary	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Public Health/ Public Safety	(Impact continued from previous page)	considerably over time depending on various channel characteristics and the frequency of maintenance. A prudent measure would be to implement a monitoring program after project implementation to gain greater confidence in both current and depth estimates. If the actual values are demonstrated to be significantly different, the risk to public health may also be significantly different. To address this issue, the following measures shall be made conditions of the Coastal Development Permit and future permits required from the City of Del Mar: a program to monitor changes at the inlet channel during the initial two years following project completion shall be developed by the applicant in association with the City of Del Mar and conducted by the project applicant. The results of this monitoring program shall then be provided to the CCC and the City of Del Mar for review on a yearly basis. If the initial results indicate a significantly higher risk to public health, as determined by the CCC and City of Del Mar, then funding for additional lifeguard patrols in this area shall be provided by the project applicant to the City of Del Mar, which is responsible for lifeguard activities in this area. This measure would mitigate the potential impact to a less than significant level (Class II). To ensure that this measure is implemented, SCE shall post a bond with the City of Del Mar to cover the cost of additional lifeguard patrols during peak use periods (the actual amount of the bond would be worked out between the City of Del Mar and the applicant during the processing of required permits from the City of Del Mar). If during the two-year monitoring program, it is concluded that there is a significantly higher risk to public health that originally	

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Public Health/ Public Safety	(Impact continued from previous page)	estimated, the funds set aside by the applicant would be used to increase lifeguard patrols. If, however, the monitoring program indicates no significant change over the original estimates, the bond would be refunded to the applicant following review and approval of the two-year monitoring report.	
	There is a potential for uncovering hazardous wastes and/or munitions during excavation.	A monitoring, emergency response, and reporting plan shall be prepared and implemented prior to the start of any on-site dredging or excavation. The plan shall address procedures for protecting worker safety and public health in the event that hazardous wastes or munitions are encountered. The construction contractor shall be responsible for implementing this mitigation, with oversight by SCE or JPA.	Less than significant
Cultural Resources	Unanticipated discovery and disturbance of buried archaeological resources during excavation and dredging.	Implement archaeological monitoring program.	Less than significant
Paleontological Resources	Unanticipated discovery and disturbances of fossils during excavation and grading.	Implement paleontological monitoring program.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Public Utilities	Several electrical transmission lines would have to be relocated.	Relocation of electric lines shall be performed in a manner that avoids or minimizes service disruptions.	Less than significant
	The Pacific Bell telephone duct bank located to the east of the I-5 right-of-way could experience exposure due to scour at the opening to the southern basin on the south side of the San Dieguito River.	Mitigation for potential impacts to the Pacific Bell duct bank could involve one of the following options: • Lower the existing concrete vault to avoid impacts from increased scour; or • Modify the currently proposed channel configuration in the area immediately east of the I-5 bridge to reduce anticipated channel velocity during a flood event. This would involve moving the western end of Berm B8 slightly to the north in order to reduce flow constriction in this area; or • Construct a grade control structure downstream of the duct bank. Two methods are available, including (1) driving a steel sheet pile wall parallel to and some distance downstream of the duct bank at or slightly below the existing channel bed elevation, or (2) installing a cellular concrete mat, such as armorflex, over the existing duct bank.	Less than significant
	An 8-inch sewer force main that crosses the San Dieguito River between the Jimmy Durante Boulevard Bridge and the NCTD Railroad Bridge could be disturbed by dredging equipment and project-induced scour.	This sewer line would not be impacted by this FRP.	Less than significant

Table 4.~~7~~8. Assessment of Significant Impacts (Cont.)

Resource	***Significant Impact***	***Mitigation Measure***	***Significance After Mitigation***
Noise	Use of construction staging area SA1 would create adverse noise impacts to residences located near the mouth of the river.	The boundaries of construction staging area SA1 shall be kept at least 100 feet from residences located adjacent to the south, although as-needed construction work may temporarily occur within 100 feet. All internal combustion engine-driven equipment shall be properly muffled. The use of construction equipment in this area shall be limited to daytime weekdays, 7:00 A.M. to 7:00 P.M. and Saturdays from 9 A.M. to 7 P.M. No construction shall be allowed on Sundays or City of Del Mar holidays	Less than significant
	Dredging/excavation activities at the river mouth and in the inlet channel would create adverse noise impacts at nearby residences.	When excavation and dredging (including maintenance dredging) are required between the beach and the railroad bridge and within a distance of about 1,000 feet to the east of the Jimmy Durante Bridge, an electric dredge, or other equipment that reduces the decibel level to 75 dBA or less, shall be used in place of conventional construction equipment. Maintenance dredging shall occur during daylight hours only.	Less than significant
	The potential use of public address systems at the Via de la Valle site (Area U18) could cause excessive noise at nearby residences.	Implementation of U18 is not a part of the FRP.	NA
	Noise impacts to residences near the end of Racetrack View Drive could occur from use of the access road leading to construction staging area SA3.	SA 3 is no longer proposed. Construction access is no longer proposed at this location. A permanent access road would be required to provide for periodic maintenance of the nesting site. However, vehicular use of this road would be minimal.	Less than significant

4.6 PUBLIC ACCESS FACILITIES

4.6.1 Introduction

The Public Access Facilities element of this FRP, Section 4.6, incorporates the JPA proposals for access to and interpretation of the many resources that can be viewed in this area. The element includes the design and location of park facilities, such as staging areas, viewpoints, and a nature/interpretive center. The proposed trails plan is presented in Figure 4.17. In certifying the Final Environmental Impact Report for the San Dieguito Lagoon Wetland Restoration Board, the Board of Directors of the JPA adopted findings that concluded that inclusion of the trail system is a necessary mitigation measure for the Wetland Restoration Project, determining that any adverse impacts from the construction of the new trails is insignificant and is greatly outweighed by the overall benefits of eliminating the existing uncontrolled access and by the institution of trail monitoring and policing, litter control, etc., that are proposed as part of the project. Trails benefit the project by enhancing public appreciation of the restoration effort. The proposed trail will provide opportunities for nature study and education about wetland values. The Board determined that accommodation of the planned human uses as part of the Project through implementation of the managed trail system is necessary to avoid otherwise significant adverse impacts and to ensure the viability of the overall restoration project because the trail system will guide~~channelize~~ public use into appropriate areas thus mitigating potential impacts to sensitive habitat associated with unregulated access throughout the site. In addition, the proposed formalized trail system will compensate the public for the loss of existing informal public access.

With the exception of the Coast to Crest Trail, which is located within the minimum one hundred foot buffer in some locations, there is a buffer between the upland edge of the transition area and all public access project components.

As previously described, the JPA portion of the project would implement a series of four connected freshwater runoff treatment ponds, occurring within Module TP41. These freshwater runoff treatment ponds will be installed on a 4.6-acre segment located immediately south of the Albertson's shopping center. The purpose of the treatment wetlands is filtration of sediment, nutrients, heavy metals, oily substances, and invasive plant species collected from the watershed during low hydrologic flows, and to reduce the flow of freshwater into the newly restored tidal salt marsh system.

As previously mentioned, the JPA has insufficient funding at this time to do anything more than construct the trail and related facilities through the restoration area. The permanent nature/ interpretive center is not included in this restoration plan.

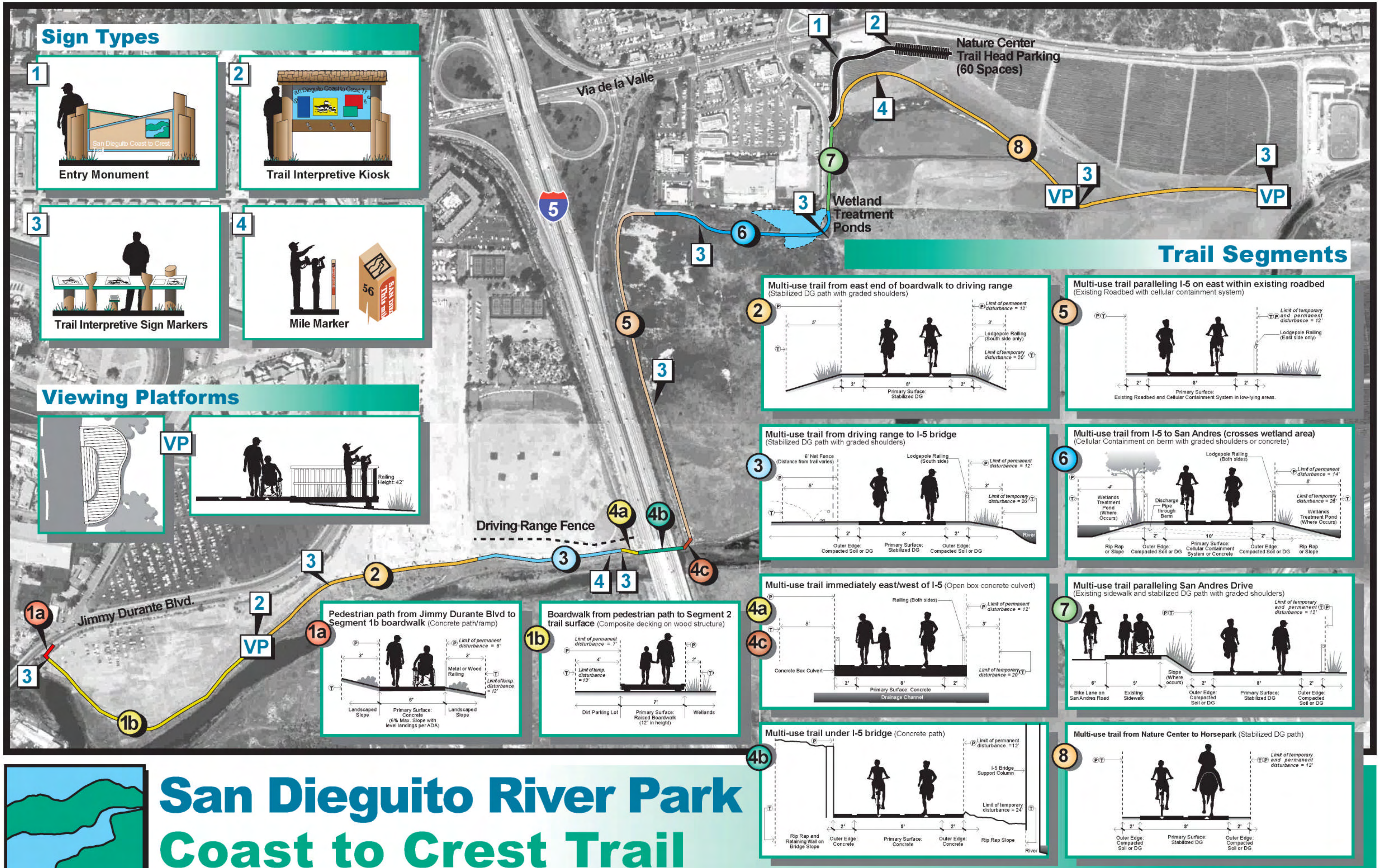


Figure 4.17. Coast to Crest Trail Plan

4.6.2 Coast to Crest Trail

As envisioned by the JPA adopted Park Concept Plan, the Coast to Crest Trail is a multiple use, non-motorized trail system for hikers, bicyclists, and equestrians. This regional trail is proposed to extend for 55 miles from the beach at Del Mar to Volcan Mountain, north of Julian. Seventeen miles of the Coast to Crest Trail already exist, and an additional three miles are currently under construction. The JPA operates and maintains the Trail system with its Ranger staff, currently four in number, and a volunteer maintenance and construction crew and volunteer patrol. Once the wetland restoration project is completed, additional ranger staffing will be assigned to the coastal area for trail maintenance and patrol activities.

The Coast to Crest Trail is designed to consist of two separate trail types which frequently are aligned side-by-side, but which may be separated. One trail type would accommodate hikers and equestrians. It is an average of four feet in width and has a tread surface of native soil or decomposed granite. The other trail type is for bicycles and other users who require a hardened surface. This type of trail, which is intended to meet the requirements of the Americans with Disabilities Act and Caltrans' Class 1 bike path standards, has an 8-foot-wide hardened surface. The Concept Plan calls for the trail tread to consist of concrete, soil cement/soil stabilizer, or a polymer binder. Due to the proposed Coastal Trail alignment's proximity to wetland habitat, asphalt will not be used. The preferred trail surface will be decomposed granite combined with soil cement or other non-petroleum binder. The design grade for the trail is 0-5 percent with a maximum of 2 percent preferred. The cross slope should be 2 percent to facilitate drainage.

The JPA's alignment for the Coast to Crest Trail in the coastal area, which represents the westernmost extent of the trail, is along the north side of the San Dieguito River. The proposed Coast to Crest Trail has been aligned to avoid sensitive habitat to the extent feasible. It would be located along the outer edge of the project area perimeter and on existing disturbed areas in all cases. The long-term plan is for the Coast to Crest Trail to link all the way to the beach, however no alignment has been identified at this time west of Jimmy Durante Boulevard. Therefore the trail described in this Plan extends from Jimmy Durante Boulevard to the Horsepark. ~~and eventually to El Camino Real.~~

Segment by segment descriptions follow, beginning at Jimmy Durante Boulevard. Illustrations of the trail segments, viewing platforms and sign types can be found on Figure 4.17.

From Jimmy Durante Boulevard, pedestrians would access the trail via a newly constructed trail segment (1a) leading from the road down to the boardwalk (1b). Bicyclists would access the trail by exiting from Jimmy Durante Boulevard at the first vehicular entrance and proceeding across the Fairgrounds property near where it narrows, directly to Segment 2 (bypassing the boardwalk). The boardwalk is for pedestrians only.

Segment 1a brings the pedestrian down from Jimmy Durante Boulevard to the beginning of the trail (Segment 1b). Segment 1a is an 80-foot-long concrete path. (From Jimmy Durante Boulevard, hikers can go south on the existing Jimmy Durante Boulevard Bridge, and from there either go west on the existing River Path Del Mar or east on a planned future trail to the Grand Avenue Overlook.) Ultimately the western route would provide access to the beach and to the proposed Coastal Rail Trail.

Segment 1b would be a 12" high boardwalk for pedestrian use only. It will have a six-foot-wide pedestrian walkway clearance. This segment begins at Jimmy Durante Boulevard via Segment 1a and skirts the southern edge of the Fairgrounds overflow parking lot for a distance of approximately 1,460 feet. The boardwalk will be composed of recycled composite lumber.

Segment 2, approximately 1,400 feet long, would be the beginning of the 12'-wide multi-use section of the trail. Bicyclists approaching from Jimmy Durante Boulevard would enter the trail at the juncture of Segments 1 and 2. Bicyclists heading west on the trail would be directed at that point to cross the dirt lot to the existing vehicular ramp, and from there to the existing bike lanes on Jimmy Durante Boulevard where they could then travel south to Powerhouse Park or north to Solana Beach. Most of Segment 2 will be located on an existing dirt berm. The trail will be composed of an 8-foot-wide, stabilized, compacted decomposed granite (d.g.) surface, with 1" header boards on both sides of the 8-foot-wide trail portion to give definition to the trail, and 2-foot-wide graded shoulders.~~Segment 1a brings the pedestrian down from Jimmy Durante Boulevard to the beginning of the trail (Segment 1b). Segment 1a is 80 feet long. (From Jimmy Durante Boulevard, hikers can go south on the existing Jimmy Durante Boulevard Bridge, and from there either go west on the existing Del Mar River Path or east on a planned future trail to the Grand Avenue Overlook. Ultimately the western route would provide access to the beach and to the proposed Coastal Rail Trail.~~

~~Segment 1b would be a 12" high, 6' wide boardwalk for pedestrian use only. This segment begins at Jimmy Durante Boulevard via Segment 1a and skirts the southern edge of the Fairgrounds overflow parking lot for a distance of approximately 1,460 feet.~~

~~Segment 2, approximately 1,400 feet long, would be the beginning of the 12'-wide multi-use section of the trail. Whereever feasible, Segment 2 would utilize the existing earthen berm that lies at the outer edge of the Fairground parking lot. Bicyclists approaching from Jimmy Durante Boulevard would enter the trail at the juncture of Segments 1 and 2. Bicyclists heading west on the trail would be directed at that point to the existing bike lanes on Jimmy Durante Boulevard where they could then travel south to Powerhouse Park or north to Solana Beach. This juncture would be the western extend of equestrian use of the trail, until such tiem as the trail is extended westward to the beach. Signs will indicate that equestrians must turn-around and return. The turn-around location wouold be at the west end of Segment 2, before the boardwalk is reached.~~

~~Directly across from the junction of Segment 1 and 2 would be a small parking lot (20 spaces) that would be used by non-equestrian trail users. (See diagram below). The parking lot fencing would be wooden lodgepole fencing. During the fair and other significant Fairground events, the parking lot gates would be opened to Fairground visitors and would not be exclusive to trail users.~~ As indicated on the diagram, there will be a viewing platform at the junction of Segments 1 and 2. This feature will help to identify this spot as the Coast to Crest Trail terminus.

Segment 3 would be 840 feet long and located at the southernmost boundary of the Surf & Turf Golf Driving Range. A 6-foot-high net fence is proposed to be located north of the trail outside of the floodway to protect trail users from golf balls that may still be rolling at this point. The net will be removed during Fairground operations that utilize the Surf & Turf lot for parking. The trail will be composed of an 8-foot-wide, stabilized, compacted decomposed granite (d.g.) surface, with 1" header boards on both sides of the 8-foot-wide trail portion to give definition to the trail, and 2-foot-wide graded shoulders.

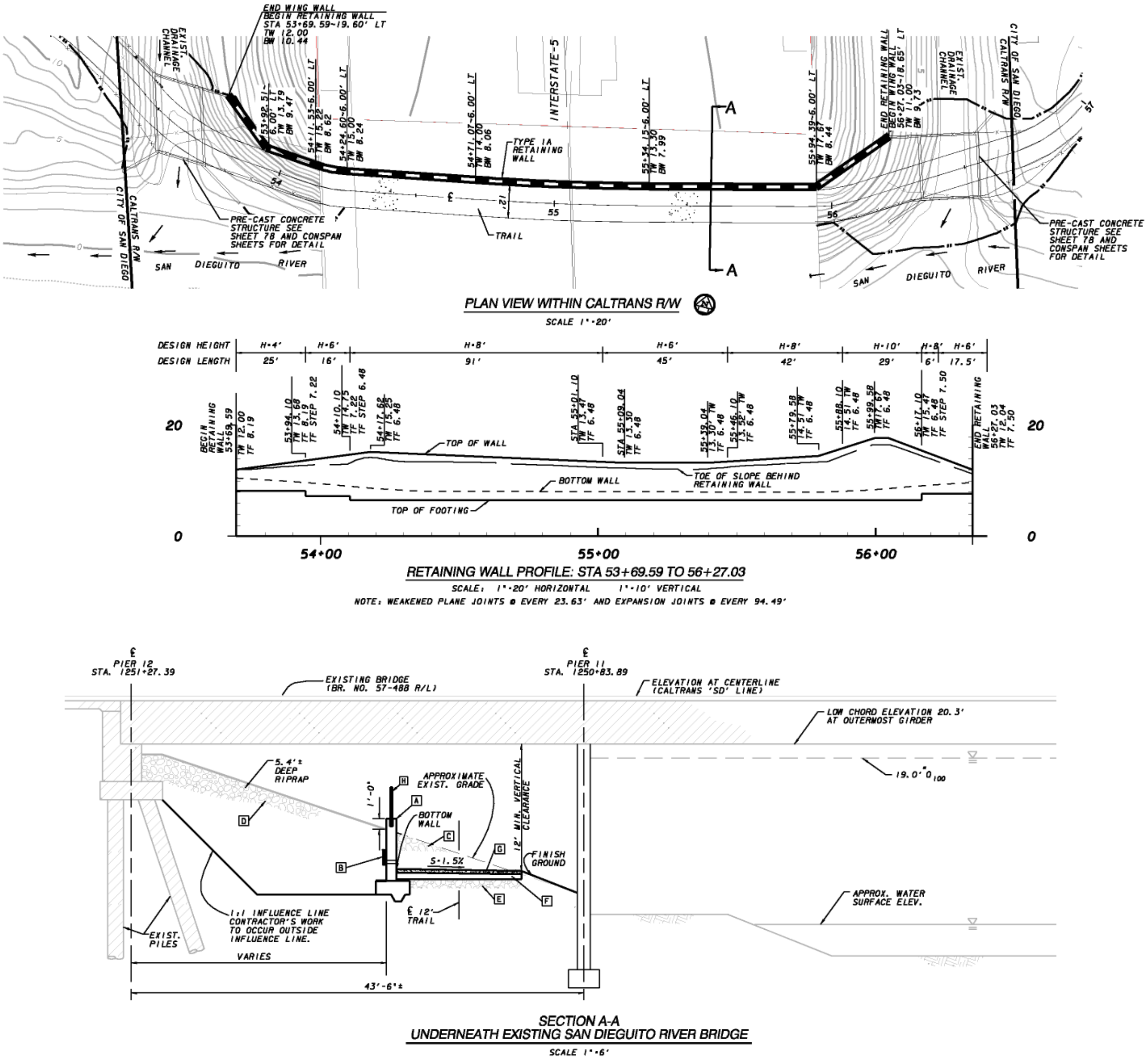
Segment 4 would cross under the I-5 freeway bridge as well as two drainage channels on both sides of the freeway. In order to pass under the I-5 Bridge, an undercrossing would be constructed within the northernmost bay of the I-5 Bridge. No water flows through this bay, which is currently lined with riprap, during normal river flows. The trail would, however, be subject to inundation during significant storm events. The undercrossing would require that the two drainage channels occurring on both sides of the freeway be crossed. These crossings would be accomplished using open bottom concrete box culverts. Bridges are not desired because they could impede flows during flood events. ~~The culverts would be a maxiumum of 12 feet in width.~~ Under the freeway (Segment 4b), the entire trail would be constructed of concrete and would be designed as indicated on the cross-sections provided in Figure 4.18. Under the freeway the trail would be 12 feet wide, with 12 feet height clearance.

Segment 4a is 110 feet long. An open bottom concrete ~~A concrete box culvert~~ is proposed to bridge the riprap lined drainage crossing. Of several crossing methods considered, this structure has been determined to have the least impact on wetland habitat without affecting the hydrologic conditions. Segment 4b is 220 feet long.

Segment 4c is 120 feet long. As also in Segment 4a, a~~A~~n open bottom concrete culvert is proposed to bridge the drainage crossing. Again, of several crossing methods considered, this structure has again been determined to have the least impact on wetland habitat without affecting the hydrologic conditions.

Segment 5, about 2,000-feet-long, would be parallel to I-5, utilizing an existing maintenance road. No widening is necessary. The maintenance road is used by ~~Pacific Bell~~ SBC to maintain fiber optic cables that parallel I-5. This segment would be the western extent of equestrian use of the trail, until such time as the trail is extended westward to the beach. Signs, located 25 feet north of the undercrossing, will indicate that at that point ~~will indicate that~~ equestrians must turn-around and return before crossing under the freeway. No improvements are planned for this segment except to repair a few muddy, rutted areas.

Segment 6, about 1,100-feet-long, would continue on the maintenance road, behind the Albertson's shopping center. There is substantial urban run-off in this location. Consequently, it is proposed to create a series of freshwater runoff treatment ponds (See Figures 4.21 and 22) that would serve to treat and clean the urban run-off before the water reaches the finger channels of the restored wetlands as described later in this chapter. The trail would be built up to allow the water to flow between treatment ponds underneath the trail via pipes. A portion of the trail surface through this Segment, where the trail forms a spillway for stormwater runoff, will be composed of concrete. The remainder of the trail surface through the treatment pond wetlands will be composed of a cellular containment geogrid with decomposed granite. Through the treatment pond wetlands, the trail will be 14' feet wide to accommodate utility maintenance trucks.



CONSTRUCTION NOTES

- [A] RETAINING WALL TYPE 1A (CALTRANS STD DWG. NO. B3-3)
- [B] ¾" GRAVEL BACKFILL AND DRAINAGE PER CALTRANS STD DWG NO. B0-3(3-1)
- [C] EXIST. RIPRAP TO BE RELOCATED OR REMOVED
- [D] EXIST. RIPRAP TO REMAIN IN PLACE
- [E] EXIST. RIPRAP TO BE REMOVED AND REPLACED WITH EMBANKMENT
- [F] CLASS 2 BASE (6")
- [G] CONCRETE (4")
- [H] CABLE RAILING TO BE INSTALLED ON TOP OF THE RETAINING WALL PER CALTRANS STD. DWG NO. B11-47. STA 12+26.00 TO 12+41.00 TO HAVE ONLY 2 ROWS OF GALVANIZE CABLE.

NOTE: ALL ONSITE, PRIVATE IMPROVEMENTS WITHIN CALTRANS RIGHT-OF-WAY AS SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. THE CITY ENGINEER'S APPROVAL OF THIS DRAWING, IN NO WAY CONSTITUTES AN APPROVAL OF SAID PRIVATE IMPROVEMENTS. A SEPARATE PERMIT FOR SUCH IMPROVEMENTS MAY BE REQUIRED.

NOTE: ALL WORK WITHIN THE CALTRANS RIGHT-OF-WAY SHALL CONFORM TO STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION 1999 STANDARD PLANS AND SPECIFICATIONS AND THE ERRATUM NO. 99-1. SEE CALTRANS ENCROACHMENT PERMIT NO. 050113 FOR PRIVATE IMPROVEMENT WITHIN CALTRANS RIGHT-OF-WAY.

NOTE: ALL WORK WITHIN THE CALTRANS RIGHT-OF-WAY IS TO BE DONE 8:30 A.M. TO 3:00 P.M., MONDAY THROUGH FRIDAY, AND AS DIRECTED BY THE STATE INSPECTOR.

NOTE: SEE KTUA WALL DECORATIVE PLANS FOR DECORATIVE CONCRETE TREATMENT OF RETAINING WALL UNDERNEATH INTERSTATE 5 BRIDGE.

Figure 4.18. San Dieguito River Bridge North Abutment Profile: 12-foot Bike Path/Trail

Segment 7, 653-feet-long, would parallel San Andres Road. There is an existing sidewalk along San Andres Road. Pedestrians and bicyclists may utilize the sidewalk or road, respectively, to enter or leave the Coast to Crest Trail at this point. The trail will be composed of an 8-foot-wide, stabilized, compacted decomposed granite (d.g.) surface, with 1" header boards on both sides of the 8-foot-wide trail portion to give definition to the trail, and 2-foot-wide graded shoulders.~~Segment 6, about 1,100-feet-long, would continue on the maintenance road, behind the Albertson's shopping center. There is substantial urban run-off in this location. Consequently, it is proposed to create a series of stormwater treatment ponds (See Figures 4.21 and 22) that would serve to treat and clean the urban run-off before the water reaches the finger channels of the restored wetlands as described later in this chapter. The trail would be built up to allow the water to flow between treatment ponds underneath the trail via pipes.~~

~~Segment 7, 653-feet-long, would utlize the right of way of the existing San Andres Road, and the existing sidewalk, in addition to new trail construction.parallel San Andres Road.~~

Segment 8, 2,829-feet-long, would be located on excavated soils that will be placed on this site as part of the Wetland Restoration Project, along the top of the proposed 4:1 slope that will separate the proposed fill area from the restored wetland by 100 feet or more. Near the western end of this property, the trail would pass the site of a future Nature/Interpretive Center~~, which is described in greater detail below~~. Viewing platforms would be located midway at an appropriate location adjacent to the trail and at the end of this trail segment. The trail will be composed of an 8-foot-wide, stabilized, compacted decomposed granite (d.g.) surface, with 1" header boards on both sides of the 8-foot-wide trail portion to give definition to the trail, and 2-foot-wide graded shoulders.

~~Several special design features are proposed for the trail to insure compatibility with adjacent uses and sensitive habitat. These design features are described in the FEIR and Park Master Plan. Fencing would be employed to separate trail users from adjoining uses on 22nd District Agricultural Association property, to the extent required by the 22nd DAA.~~ For much of the trail's alignment, a lodgepole fence would be installed along the southern or eastern edge of the trail to provide a physical and psychological barrier between trail users and existing or soon to be created wetland areas.

4.6.2.1 Interpretive Signage Program

Educational objectives of the interpretive program include the following:

1) A fully-functioning ecosystem is composed of a variety of habitats (i.e., salt marsh, mudflats, native grassland, riparian habitat, coastal sage scrub, southern mixed chaparral) each of which is an integral part of the whole, providing for a range of wildlife species, including forage, cover, nesting areas, refuge, etc.

To explore this theme, interpretive signage will identify the various naturally occurring or restored habitat areas, and explain the following:

- how each habitat area differs from the other habitat areas
- how they relate to each other hydrologically and geologically
- what types of species utilize each habitat type and how they occupy it
- what biodiversity means and why it is an important goal

2) One of the most important objectives to convey to Park visitors is that protection and preservation of our existing wetlands is preferred to restoration because successful wetland restoration is difficult to achieve at any cost. To explore this theme, pictorial signage will show the historical process whereby the San Dieguito Lagoon was degraded over time by filling in the floodplain and upstream river diversions. Then the effort involved in the restoration will be demonstrated with before, during and after photographs. Examples of what a successfully restored area should look like will be juxtaposed next to current photographs or in front of an actual site being restored so that park visitors can begin to judge for themselves how successful the restoration process is.

Achieving the educational objectives described above will be accomplished through various means. The first is a series of interpretive panels that can be read by Park visitors on self-guided walks along the trails. Each panel would explain something of interest that is related to the place where the sign is located. Several kiosks with interpretive information and viewpoints would also be provided. In addition to the interpretive signs, education will be achieved through the use of pamphlets with additional information, detailed displays in the future Nature Center, and docent-led hikes. Providing blinds for birdwatching on the Mesa Loop Trail will augment the viewer's experience as well. Special effort will be made to provide a variety of interpretive information for the visually and hearing impaired.

Details of the interpretive signs, topics and locations are included in the Park Master Plan for the Coastal Area.

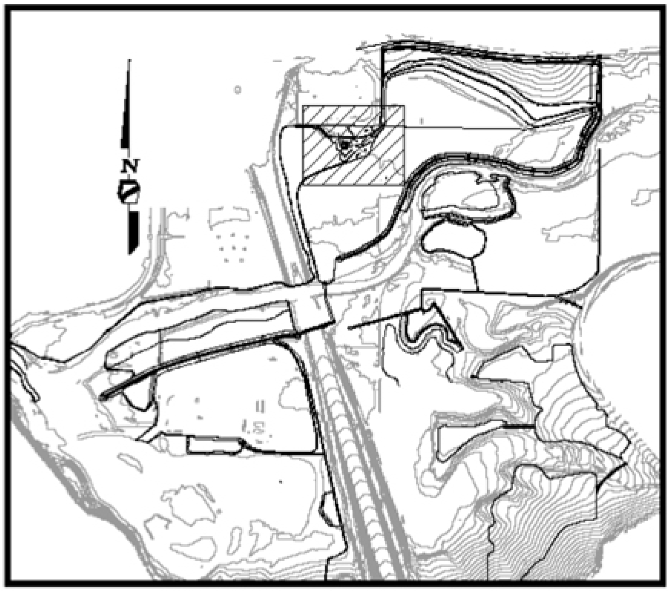
4.6.2.2 ~~Stormwater Treatment Ponds~~Freshwater Runoff Treatment Ponds

Currently, the area immediately south of the Albertson's shopping center is a collection point for a 313-acre watershed in the residential community north of Via de la Valle. This area does not contain desiltation ponds, oily wastewater separators, or any other type of filtering device used to treat runoff. It is also filled with mature invasive plant species. Without treatment, the potential for freshwater runoff to encroach upon proposed brackish and saltwater marsh habitat would be a significant threat. As this water would be freshwater and of poor quality, it would decrease the viability of the tidal restoration efforts.

Accordingly, ~~stormwater treatment ponds~~freshwater runoff treatment ponds (Figure 4.19), occurring within Module TP41, will be installed on this 5-acre segment of the project to trap and allow for easy removal of invasive species. These ponds, located off the river channel, will be constructed predominantly through the natural drainage course. High flows will be returned directly to the existing drainage course by flowing over the weir in the first basin. The low flows, which are the most polluted, would pass consecutively through the other three basins in series before returning to the natural drainage course (Figure 4.20). The trail segment in this area would be raised above the water table, and flows coming from the north would be directed underneath.

This project would include the following components:

- Create a series of f~~ive~~ connected ponds;
- Remove invasive species and protect in place the native trees;
- Create a berm for the trail and side slopes for ponds;
- Install water quality control devices including a trash rack, sediment trap, and oily wastewater separator;



KEY MAP
NOT TO SCALE

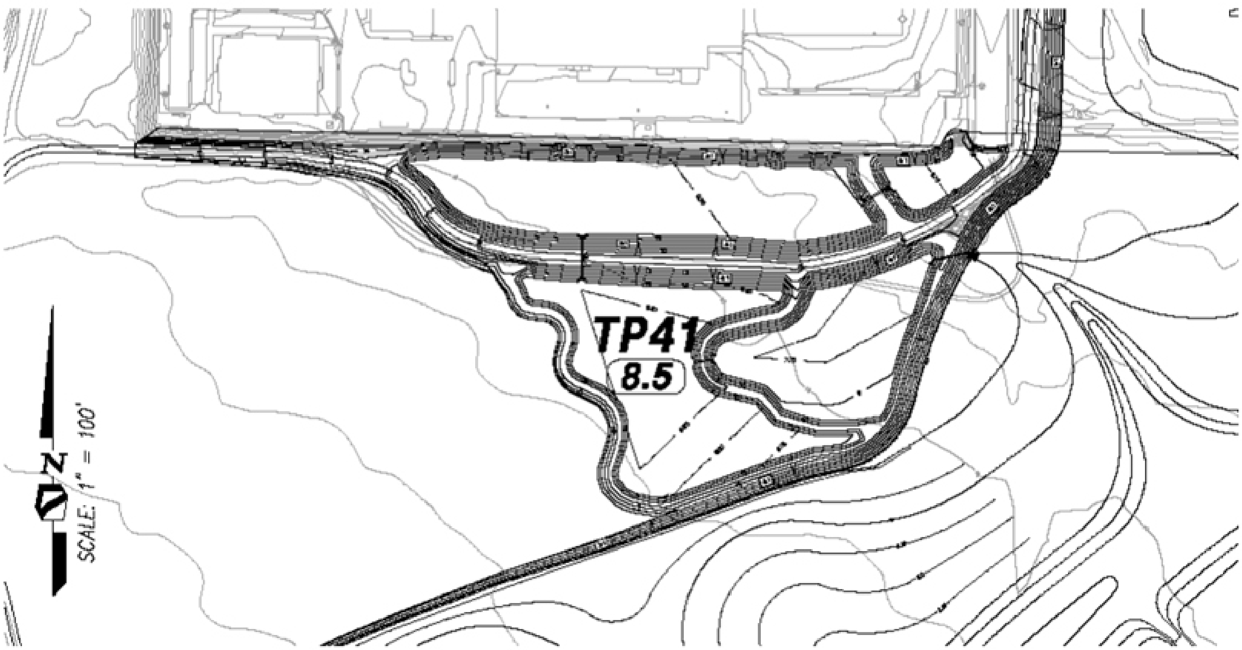


Figure 4.19. Engineering Plan for Treatment Ponds

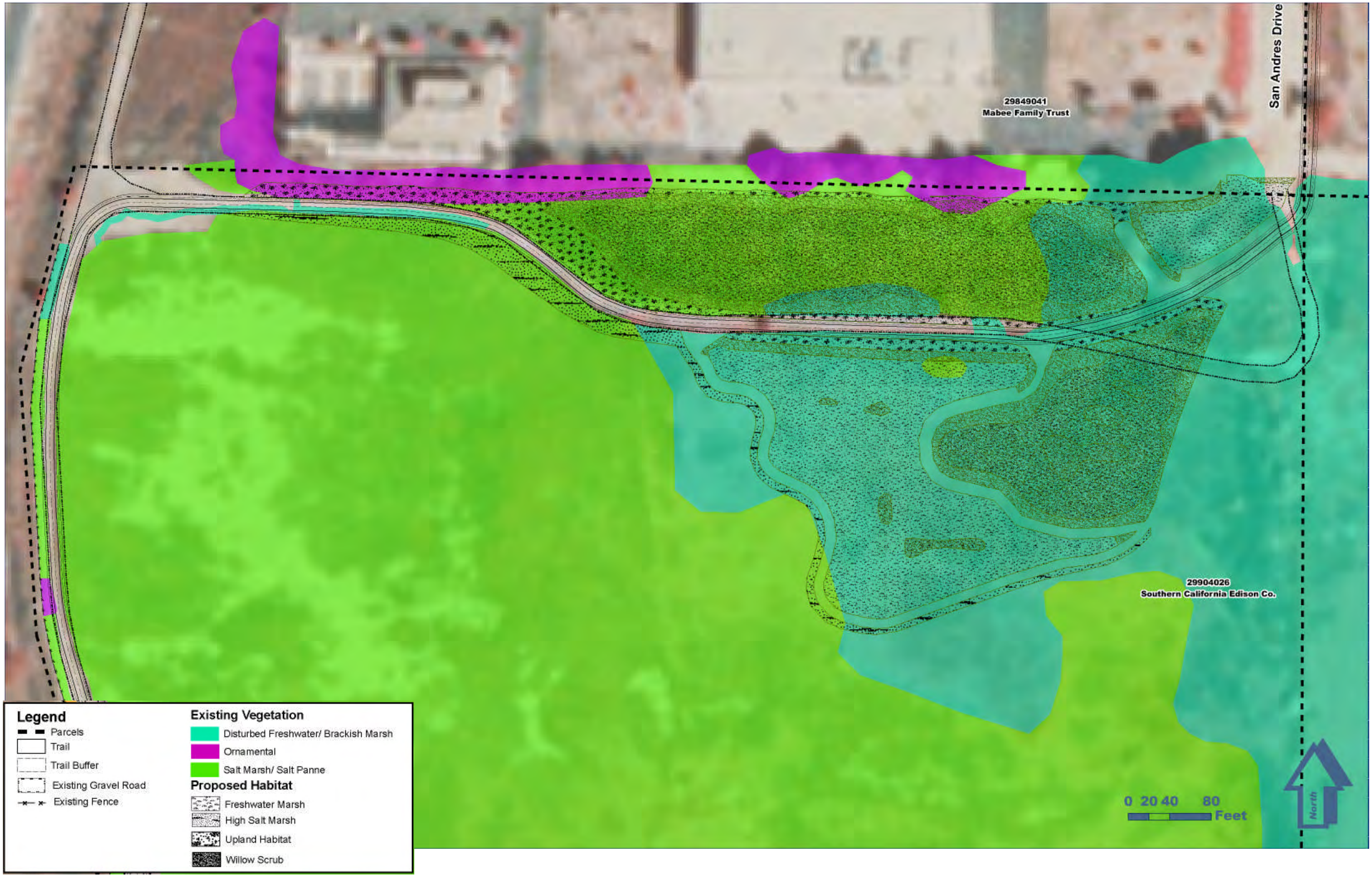


Figure 4.20. Stormwater Treatment Pond Vegetation

- Install weirs, culverts and other piping necessary to make the ponds function hydrologically;
- Install interpretive signage; and replant the full area with wetland and riparian species; and
- Maintain portions of the ~~stormwater treatment ponds~~freshwater runoff treatment ponds on a three-year cycle.

The objective of the treatment wetlands is filtration of sediment, nutrients, heavy metals, oily substances, and invasive plant species collected from the watershed during low hydrologic flows, and to reduce the flow of freshwater into the tidal salt marsh system. The retention capacity, retention time, and habitat diversity have been balanced to provide a treatment wetland that also offers diversity in habitat and points of interest for trail users. Currently, the site is comprised of disturbed freshwater marsh, disturbed brackish marsh, and remnant salt marsh.

The treatment wetlands were designed to handle the typical small storm, which is defined approximately as a 1-hour duration storm event. It is not the intent of the treatment wetlands to handle storm events other than minor storms. The focus is on urban runoff and on the first storms of the season when water quality issues are the most severe. The ponds are designed to handle all non-storm events of urban runoff as well as the typical small annual storm events. All other storm events would flow over the spillway and armored slope into an open channel leading towards the San Dieguito Lagoon and River. Even with the ponds only able to handle a small one-year flood event, 100% of the non-storm flows and most of the smaller storm events will still flow through the treatment wetlands.

The treatment wetlands consist of four basins. Their functions are presented below, beginning with basin 1 at the storm drain discharge and proceeding counter-clockwise.

1) The first basin, located at the storm drain discharge, is the smallest. It has an entry elevation of 10.0' MSL and an exit elevation of 9.5' MSL. The intended function of this basin is to capture propagules of invasive plant species, heavy metals, and sediments as they enter the system. The basin inlet will also contain a trash rack, designed to prevent larger pieces of trash from entering the system. This basin will be dredged approximately every three years to remove the invasive species as they grow and remove the minimal sediment transported through the watershed. The trash rack will be looked at semi-annually to make sure that it has been cleared of build up.

The system floodwater bypass is located adjacent to this basin and will flow over the trail to the east as well as through a weir structure and culvert system. It is armored (with concrete side-slopes, concrete spillway, the concrete trail surface and rip-rap rock) to maintain its form during more intensive storm events. Bypassed flows will feed into the larger marsh of the San Dieguito River.

2) The lower hydrologic flows will continue through the system entering the second basin directly to the west at 9.0' MSL. To promote positive flow through the system, the base contour is set at the exit elevation of 8.5 MSL. The design is sinuous to maximize bio-filtration during base flow and becomes gradually more direct from entry culvert to exit culvert as flows increase.

This basin will remove primarily oils and nutrient loads but will also function as a back up for finer sediments and invasive species. This basin will be dredged over a two-year period, with dredging the east and west portions of the basin in alternate years. The dredging will be conducted in conjunction with the first basin to ensure that only one of these areas is dredged per year. The design also supports habitat refuge during moderate flows by creating small islands.

3) The third basin directly to the south of the second receives flows at an elevation of 8.3 MSL. It has an exit culvert elevation of 8.0 MSL. The design and intent of this basin is to provide for the natural use of these excess waters, prior to them reaching the high salt marsh lagoons of the restoration project. This urban water, regardless of the water quality at the discharge point, will have a negative affect on the salt marsh proposed next to the site. The area will likely convert to a brackish marsh if too much urban runoff accumulates in the newly dredged marsh. The quantity of water reaching the marsh will be diminished by the temporary holding of the water in these ponds. A certain volume will be taken up by the proposed riparian trees and freshwater marsh species. Some of the ponded water will be lost through evaporation. Furthermore, since the bottom of the pond is not sealed, a certain amount of water will percolate. With the lower treatment ponds in place, the volume of fresh water eventually released into the tidal wetlands would be reduced by approximately one-half what it would have been if the lower treatment ponds were not constructed. Thus if the lower ponds are eliminated, then more fresh water will be introduced into the salt water marsh. For this reason, the ponds as proposed are considered the optimal size, with the smallest wetland impact that meets the project's objectives.

This pond is not proposed to be maintained and cleared of vegetation, since the greater the biomass the greater the rate of evapo-transpiration. Another function of the pond will be the last line of defense in a containment scheme. If a major pollutant enters the pond system, it will be somewhat treated and contained within the four basins, with a delay of pollutants reaching the enhanced and constructed salt marsh wetlands to the south. Once the pollutants reach the open lagoon, the spread of the pollutants will be much greater and potentially more damaging to the marsh than it would be to the wetland ponds. Also, the third and fourth basins will play a role in controlling some sediment discharge that may result from dredging and maintaining the upper two ponds on a periodic basis.

The fourth basin with an established entry elevation of 7.8 MSL and an exit elevation of 7.5 MSL. This basin functions the same as the third basin. This final basin in the system empties via a pipe to the saltwater marsh created by Southern California Edison (SCE) at an elevation of 4.5 MSL. This basin will not need maintenance nor will vegetation removal be required.

4.6.2.3 Staging/Parking Areas

The JPA park plan proposes ~~two~~ three permanent trail staging areas and a small parking area for wetland viewing at the Grand Avenue Bridge. The primary staging area, which will be unpaved, will be located at the site of the proposed future nature center where 60 spaces will be available for cars and smaller trucks and 15 pull-through spaces will be available for equestrian rigs, recreational vehicles, and buses (primarily school buses visiting the nature center). This primary staging area will be constructed in conjunction with the Coast to Crest Trail. It will serve users of the Trail as well as visitors to the Strawberry Stand Wetland Learning Center. The Strawberry Stand Wetland Learning Center is an existing temporary facility located at the site of the proposed nature center, where it will remain until such time as it is replaced by the permanent facility.

~~An unpaved parking area would also be provided along the west side of El Camino Real to provide staging for the Mesa Loop Trail. A maximum of 25 cars could be accommodated in this area. The entrance to this area would be aligned to correspond to the entry street designed for the Villas property, recently approved just to the east of El Camino Real. There is currently no signal at that location; therefore, entry into the site would be limited to right turns in and out only until a signal is installed at some future time.~~

The second permanent staging area would be an unpaved 20-car parking area for park visitors east of Jimmy Durante Blvd. in a location to be approved on 22nd DAA property as part of a separate CDP.

The third permanent staging area would be an unpaved 25-car parking area for park visitors off El Camino Real to access the Mesa Loop Trail. The Mesa Loop Trail and the parking area for it will be part of a separate CDP.

In addition, approximately five cars could be accommodated just off San Dieguito Drive at the foot of the Grand Avenue Bridge. Visitors currently frequent this area to view the wetlands. A portion of the bridge would be removed as a result of the project; however, a viewing area with interpretive panels would be maintained to provide visual access into the restored wetland area.

~~Approximately five cars could be accommodated just off San Dieguito Drive at the foot of the Grand Avenue Bridge. Visitors currently frequent this area to view the wetlands. A portion of the bridge would be removed as a result of the project; however, a viewing area with interpretive panels would be maintained to provide visual access into the restored wetland area.~~

~~The plan also proposes designating an area north of the river and east of Jimmy Durante Boulevard, in the westernmost end of the District's overflow parking lot for trail staging. See diagram in Section 4.6.2. This area would accommodate approximately 20 vehicles. This area would not be available during District events, such as the Del Mar Fair.~~

4.6.2.4 Public Access and Park Facility Management Plan

In order to insure that the goals of the Park Master Plan for the Coastal Area are met, the management of this area requires daily inspection of Park facilities and restoration areas and interaction with the public in interpretation and enforcement roles. Diligent patrol will be especially important in order to exclude problems with habitual dog off leash problems and other off trail activities.

Park staff would patrol the project area no less than once per day and ideally 3 times per day, 7 days a week. The patrols would be spread out in order to visit park facilities and assets, including restoration sites, at varied times. Evening and early morning patrols will be of great benefit due to potential intrusions, such as off trail activities, fishing, and dogs off leash, that could be more likely to occur during these hours.

This would consist of checking staging areas and trail corridors for trash, illegal activities, vandalism, and in order to make public contacts. Rangers would provide visitors with maps, interpretive information, and answer questions. The physical presence of a Park Ranger is important so that park patrons can feel safe while using the trails and know that park rules will be enforced if needed. Maintenance needs would be noted or if possible the problem repaired or at least made safe. Park Rangers would leave their vehicle, walk around the staging area, trail head, and trail section or vicinity, and check park assets such as benches, signage, and bathrooms, clean up scattered trash, remove horse manure along the trail, empty and replace trash bags, and fill brochure and dog waste bag dispensers. They would also regularly empty and properly dispose of manure collected in the equestrian manure collection receptacle.

In order to help insure the success of restoration work and to educate visitors as to the importance of the project, Park Rangers would patrol susceptible restoration areas by vehicle daily. Initially, these areas include: San Dieguito Drive, San Andres Drive, Jimmy Durante Boulevard, Horse Park, and sections of El Camino Real. Once the project is in place, Park Rangers would have a better understanding of exactly which areas are most susceptible. During the patrol, Rangers would identify and report maintenance needs, problems, special occurrences, or other observations that may be of use to restoration project managers and also contact trespassers and the general public in order to educate them about the project and to enforce Park rules. Park Rangers would also identify locations and sources of pollution from trash dumping and businesses and agriculture adjacent to the project area, and then report the information to the appropriate agency.

To increase oversight on the trails and restoration site, trained and uniformed volunteers would patrol the trails in pairs, with radio or cell phone access to the Rangers. Representing the Park, volunteer patrol would provide visitors with maps, interpretive information, and answer questions. The presence of dedicated citizens is important to instill a sense of stewardship in the community. If problems arise they will immediately alert the Park Rangers for assistance. Park staff would provide annual training for the Volunteer Patrol members, who are then expected to commit to patrolling in the Park for 8 hours a month. River Park staff would coordinate the training and scheduling of the Volunteer Patrol.

Beyond patrolling, Park Rangers would plan and implement projects in order to repair or create Park facilities, educate visitors, and improve and designate access. Park staff, volunteers, and paid contractors and/or laborers would complete projects and tasks. Park Rangers would need ready access to tools and equipment in order to implement some projects, described in more detail below.

General repair or maintenance projects associated with the management and operation of the trail system, staging areas, and public facilities. Projects include fence installation or repair, repair or replacement of vandalized Park assets, the construction and installation of benches, information kiosks, picnic tables, routed signs, hitching posts, etc., sign purchasing and installation, cleaning of interpretive signage, and minor trail repair.

Park facilities would be maintained so that vandalism and weathering is controlled and the public has a good impression of the restoration project and Park.

In order to maintain the trail design grade and fulfill the American Disabilities Act requirements, a high amount of trail maintenance is expected due to the overall moisture level of the project site, potential for high usage known to occur in coastal wetland areas, as well as for transportation purposes, and the need to control erosion from entering into the restoration site or adjacent wetlands from the trail.

Trail maintenance would occur for public safety and to protect the ecological resources of the project site by promoting the usage of the trail corridor and discouraging intrusion into sensitive areas. This is accomplished first by design then maintained in order to provide a good walking surface free from puddles or obstructions and by the creation, construction, and maintenance of amenities that encourage stewardship such as a scenic lookout with benches or landscaped trail corridor or staging area. Trail maintenance would also include activities such as erosion control, which could be extensive in certain winters, or the planting of vegetation, where appropriate, in order to discourage off trail activities or to define the trail corridor. Where the trail surface is a hard natural pavement material, the surface would require little or no maintenance. Where the surface is damaged, repair would consist of filling holes or patching with new mixture.

Park Rangers would be equipped to conduct trail maintenance activities, including grading and compacting equipment and the access to materials. Trail maintenance project activities would occur frequently, which may require the assistance of volunteers and/or contracted assistance or labor.

Since staging areas experience the most concentrated amount of visitors, including those who do not leave their car or the vicinity, staging area maintenance projects, beyond daily patrol, is required. Staging area gates, fences, trashcans, and entrance signage would be maintained in order to make a good impression upon the public. The staging areas may also need frequent grading. Equestrian staging areas would require additional maintenance including manure removal and maintaining hitching posts.

Staging area gates would be opened daily at sunrise and locked at sunset by a qualified security service. Restrooms would be opened and closed by the security service and cleaned by a qualified housekeeping service. A sanitation company would service portable toilets.

Park rangers would be responsible for maintaining proper functioning of the wetland treatment ponds, which would include dredging the first treatment basin, located at the storm drain discharge, approximately every three years to remove sediment and invasive species. This would be done either by a contractor hired by the JPA or park rangers with rented equipment (backhoe). The second basin would ~~also~~ be dredged regularly, on alternate years with Pond 1. Invasive species would be regularly removed from all the basins.

Park Rangers would monitor areas that are identified as a low priority for patrol. This includes the entire habitat restoration project not identified as susceptible restoration areas in Section *2.2 Restoration Site Patrol*, which will be patrolled daily. Some of these areas are difficult to access or away from populated areas and therefore less susceptible to human intrusion. Trail segments away from the staging areas would be patrolled to insure rule compliance and to check for maintenance needs. During the patrol, Rangers would identify and report maintenance needs, problems, special occurrences, or other observations that may be of benefit to restoration project managers. Park Rangers would also identify locations and sources of pollution from trash dumping and businesses and agriculture adjacent to the project area, then report the information to the appropriate agency.

4.6.3 Trail Elements Not Part of Final Restoration Plan

4.6.3.1 Trail Segment 9

Segment 9, which is 2,596 feet long, and ends at El Camino Real, will be processed as part of a separate permit application. This is the segment that will cross on the north side of the river at the southern edge of the Horsepark operation. The Horsepark facility, as currently configured, does not have space to accommodate the trail. The future alignment will be analyzed in coo~~r~~peration with the Horsepark administrative staff, and may involve a reconfiguration for the facility's operations, including potentially moving some elements to an adjacent property. This segment will ultimately connect to an existing public trail located to the east across El Camino Real via an undercrossing of the El Camino Real/San Dieguito River Bridge. This undercrossing proposal is not proposed as a part of the Final Wetland Restoration Plan, but will be designed and analyzed in association with the future bridge/road improvements currently under consideration for El Camino Real by the City of San Diego.

4.6.3.2 Nature/Interpretive Center

The JPA proposes a future 6,000-square-foot nature/interpretive center for the northwest six acres of the Via de la Valle site (DS32). This project will be part of a future CDP application.

The facility would include space for exhibits, volunteer areas, lobby, information desk, storage and utility room, restrooms, ranger offices and/or administrative offices, and possibly a small auditorium and/or multi-purpose room. Also included on the site would be a picnic area, botanical walk, interpretive stations, and parking spaces to serve visitors of the center, as well as to provide staging for trail users. A total of 60 parking spaces for cars and 15 parking spaces for equestrian rigs and buses would be provided to the east and west of the center. The northern edge of the site, that area adjacent to Via de la Valle, would be planted with Torrey Pines and other native vegetation. Oaks would also be planted in the area to provide a natural setting. Entry onto the Coast to Crest Trail would be directly accessible from the center. The only exterior lighting to be provided on the site would be that needed for security, and the entrance to the site would be gated at night to prevent overnight parking or any other unauthorized nighttime use of the facility.

4.6.3.3 Nature/Interpretive Trails

In addition to the Coast to Crest Trail, a nature/interpretive trail called the Mesa Loop Trail is planned, but will be part of a future CDP application.~~proposed.~~ ~~This trail is the Mesa Loop Trail, described in more detail in section 4.6.2.3.~~ The adopted Park Master Plan for the Coastal Area also proposed an overlook trail along the top of the berm that would extend out over the restored wetlands north of the river. At the Coastal Commission staff's request, the JPA does not plan to pursue that proposal, offering public viewing instead at several viewing platforms to be constructed along the edge of the trail.

4.6.3.4 Mesa Loop Trail

The Mesa Loop Trail would be located to the south of the river and the west of El Camino Real on uplands currently owned by the City of San Diego. It will be the subject of a future CDP application.~~.~~ The trail would be setback slightly from the edge of the mesa that looks down on the surrounding floodplain. This trail is proposed as a pedestrian only interpretive loop trail that is intended to provide overlooks of the surrounding seasonal wetlands directly to the west, as well as the restored wetlands to the north and northwest. It is intended that the trail be designated as a "wildlife viewing area." No dogs would be permitted on this trail.

The trail would be approximately 1.7 miles long and 4 feet in width, with a native soil or decomposed granite surface. At various points along the trail, as it extends out toward the mesa rim, strategically placed native shrubs or some type of low profile structure would be provided to serve as bird blinds. These areas would allow maximum bird viewing with minimal bird disturbance. In addition, interpretive signs would be located along the trail to explain the differences between the types of marsh visible from the trail. Panels describing the various types of waterfowl and other birds that visit this area would also be provided.

An unpaved parking area would also be provided along the west side of El Camino Real to provide staging for the Mesa Loop Trail. A maximum of 25 cars could be accommodated in this area. The entrance to this area would be aligned to correspond to the entry street designed for the Villas property, recently approved just to the east of El Camino Real. There is currently no signal at that location; therefore, entry into the site would be limited to right turns in and out only until a signal is installed at some future time. The Mesa Loop trail is not part of the SCE/JPA Coastal Development Permit for the Final Restoration Project and/or will be processed as part of the separate permit application. It will be processed as part of a separate permit application.

4.7 EVALUATION OF STEPS FOR IMPLEMENTATION

The next step in the implementation process for the restoration project is to complete permitting. There are many agreements that will be needed in addition to the required permits and construction documents. For example, an agreement with the DAA will be needed to gain approval to conduct tidal inlet maintenance activities within the rivermouth area that is currently managed by the DAA. The necessary permits, agreements, and approvals that will be required to move forward with project implementation are summarized below. A preliminary schedule for project implementation is presented in Figure 4.21. A number of other permits are required to implement the proposed restoration including:

Federal

- 404 Permit (USACOE)
- Section 7 Consultation (USFWS)
- Conditional Letter of Map Revision (FEMA)

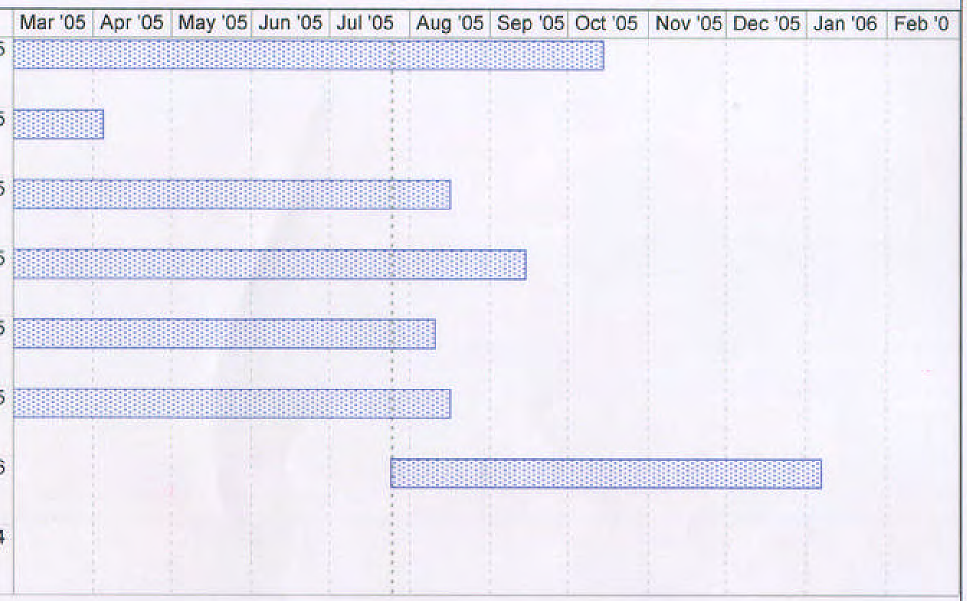
State

- Section 401 Water Quality Certification (RWQCB)
- Report of Waste Discharge ~~Permit~~ (RWQCB)
- ~~1602~~ Streambed Alteration Agreement (CDFG)
- Coastal Development Permit (CCC/Del Mar)
- Encroachment Permit (Caltrans/22nd Ag. Dist.)
- State Lands Lease (State Lands Commission)
- ~~Waste Discharge Permit (RWQCB)~~
- Power Line Relocation Authorization (PUC)

Local

- Conditional Use Permit (Del Mar)
- Design Review Permit (Del Mar)
- Encroachment Permit (Del Mar/NCTD/SDGE/Caltrans)
- Grading Permit (San Diego/Del Mar)
- Site Development Permit (San Diego)
- ~~Boring Test Approval (County Department of Public Health)~~
- Floodplain Development Permit (Del Mar)
- Land Conservation Permit (Del Mar)

ID	Task Name	Start	Finish
1	COASTAL DEVELOPMENT PERMIT (CCC)	8/25/04	10/14/05
2	COASTAL DEVELOPMENT PERMIT (Del Mar)	8/25/04	4/4/05
3	STREAMBED ALTERATION AGREEMENT	8/25/04	8/16/05
4	401 CERTIFICATION	9/30/04	9/14/05
5	WASTE DISCHARGE PERMIT	8/26/04	8/10/05
6	404 PERMIT (Restoration)	8/25/04	8/16/05
7	404 PERMIT (Inlet Maintenance and JPA Trails)	7/25/05	1/6/06
8	SECTION 7 CONSULTATION	3/23/04	6/14/04



Project: Permit Schedule 12-23-04
Date: 7/25/05

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Page 1

Figure 4.21. Preliminary Implementation Schedule

- Regional Water Quality Control Board will use the EIR/EIS to consider 401 Certification and/or Discharge Permit.
- San Diego County Air Pollution Control District will use the EIR/EIS to consider granting permit to Operate for Dredge.
- 22nd District Agricultural Association will use the EIR/EIS to consider approval to utilize portions of the District property for the project.
- The California Coastal Commission (CCC) to consider approval of the FRP and Coastal Development Permits.
- The California State Lands Commission will use the EIR/EIS to consider possible lease of State lands.
- The CDFG will use the EIR/EIS to consider the Streambed Alteration Agreement and possible Encroachment Permit.
- The California Department of Transportation (Caltrans), District 11, will use the EIR/EIS to consider Encroachment Permit.

At this time, SCE and the JPA will file joint applications for a CDP, as well as for other federal, state, and local permits and approvals where appropriate.

4.8 MANAGEMENT AND MAINTENANCE REQUIREMENTS

4.8.1 Inlet Management and Maintenance Program

Once SCE has met its obligations, SCE will turn over responsibility to the JPA for maintaining the inlet channel. As per an agreement between SCE and JPA, SCE will establish a $500,000 endowment fund at the time the CCC approves the FRP for the JPA to permit the JPA to maintain the inlet channel in perpetuity. SCE will monitor the costs of inlet maintenance over time to assure the JPA that the funding established by the agreement is adequate to meet the ongoing needs.

A maintained inlet channel is subject to gradual closure on an annual basis, due to accumulation of sand in the inlet channel, which gradually progresses to the inner lagoon. Also, certain kinds of rare storm conditions can move sand into the inlet very quickly. Some larger storm water flow events in the San Dieguito River can also clear out the lagoon opening. Therefore, a program of regular maintenance grading to keep the inlet at the desired plan elevations will be carried out.

Inspection of the channel cross-sections within the study area led to the current plan to maintain a configuration resembling that of May 1993 (-2.0 feet, NGVD to –4.0 feet, NGVD). Maintaining this configuration requires a minimum rate of sand removal, since natural sedimentation occurs slowly under these conditions. The result is minimum maintenance cost, minimal disturbance to the lagoon itself, and minimal impact to the users of the lagoon and beach.

Periodic excavation will be conducted between the Pacific Ocean and the railroad bridge. An approximate eight-month schedule for the dredging area west of Highway 101 and the railroad bridge will be undertaken to reduce the rate of sand incursion east of the railroad bridge to a small amount. Periodic sand removal will begin eight months after completion of the initial restoration plan. The area between Highway 101 and the railroad bridge will be maintained at or near the original design elevations. The volumes to be periodically removed are estimated to be 4,000 cubic yards of sand from the inlet between the ocean and Highway 101, and about 12,000 cubic yards from the channel west of the railroad bridge.

A long term monitoring program for the inlet channel is proposed to ensure a healthy tidal system. This program involves taking water level measurements, conducting inlet and channel topographic surveys, and measuring water quality. Through adherence to this program it will be possible to determine when and where dredging is needed in order to meet the intent of keeping the river mouth essentially open at all times. The program identifies standards for determining when maintenance dredging will be performed. Those conditions that will trigger the need for maintenance dredging include: a daily low water level elevation under the Jimmy Durante Bridge that exceeds 0.5 feet, NGVD; an inlet channel elevation east of the railroad bridge that is elevated by 1-2 feet; depth averaged dissolved oxygen in the lagoon basins less than or equal to 3 parts per thousand. If any of these conditions are identified, maintenance dredging will be implemented. The areas to be dredged will be determined by comparing the topographical survey data to the design configuration. Should inlet excavation occur, the dredged inlet would be no closer than 40 feet from the Sandy Lane rip rap.

The time interval specified in the plan will vary by for practical reasons related to the grading operation itself or to accommodate other activities in this area. Since excavation may be complicated by waves and storm runoff, especially during winter, initial grading after the winter storm period in early April could be followed by the first maintenance grading in November. The next maintenance grading would then take place the following September. Occasional unscheduled excavation may also be required due to sudden closure events. A monitoring plan will assess the condition of the lagoon throughout the year.

Monitoring of the inlet has been designed to be adaptive in order to ensure rapid response to changing conditions. Twice monthly measurements of the lagoon inlet channel cross-sections for the first few years until the inlet maintenance program necessary to achieve project objectives has been established. Lagoon channels east of Jimmy Durante Boulevard will be surveyed on an annual basis. Water level measurements at the new basin will be collected with an automated tidal gage. Water quality will be analyzed twice monthly at various stations for two years following construction. Revisions to the maintenance plan may be made after review of the data collected during the initial monitoring process. Following the first required re-opening of the inlet, SCE will prepare a report summarizing the results of monitoring data collected up to the re-opening date. Based on the monitoring results, SCE will implement any changes to the maintenance plan at that time, if necessary.

Conventional excavation equipment, such as one (1) front loader, two (2) excavators, and five (5) scrapers, would be used to perform the specified maintenance program. This selection was made not only on the basis of cost and flexibility in scheduling and deployment, but was also done to avoid the use of stabilization structures (e.g., jetties on the beach). Clean sand would be expected to accumulate in the channel and this type of material will be placed on the beach. The proposed disposal sites for this sand are located approximately 1,000 feet north and south of the river mouth on the open beach between the mean higher high water and mean lower low water elevation contours. The material will be discharged to the updrift side of the river mouth. Assuming that the longshore transport direction is consistent with past seasonality patterns, it is anticipated that sand would be disposed to the north in the summer and to the south in the winter.

4.8.2 Tidal Wetland Habitat

The wetland design is predicated on restoring a natural, self-sustaining tidal wetland system. The restoration undertaken by the Department of Fish and Game at San Dieguito Lagoon has not required any substantial maintenance requirements of the tidal wetland once the restoration was completed.

Initial maintenance will be limited to assuring that native plants become established within the areas that are expected to be vegetated. As noted above, some of these species will be transplanted whereas others will volunteer over time. There are only a few invasive plant species associated with tidal marshes; however, future introductions may warrant monitoring and control, as necessary. For example, *Caulerpa taxifolia*, an invasive algal species associated with subtidal habitats has been found in southern California. If this species is found in the restored San Dieguito Lagoon, specific measures may be required to eradicate it.

Control of invasive plants is species specific and dependent upon the level of invasiveness. Regular inspection of the site by SCE and JPA personnel will likely discover plants which fall under the California Exotic Pest Plant Council listings. SCE and any subsequent responsible parties for the lagoon will cooperate with federal and state authorities concerning appropriate eradication efforts.

4.8.3 ~~Uplands Habitat~~Invasives

The wetland design is predicated on restoring a natural, self-sustaining tidal wetland system. The restoration undertaken by the Department of Fish and Game at San Dieguito Lagoon has not required any substantial maintenance requirements of the tidal wetland once the restoration was completed.

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Control of invasive plants is species specific and dependent upon the level of invasiveness. Regular inspection of the site by SCE and JPA personnel will likely discover plants which fall under the California Exotic Pest Plant Council listings. SCE and any subsequent responsible parties for the lagoon will cooperate with federal and state authorities concerning appropriate eradication efforts.

4.8.4 Nesting Sites

Neither SCE nor the JPA would be responsible for maintaining or monitoring the nesting sites. It is presumed that, ultimately, the 22nd District Agricultural Association (District) would assume maintenance responsibility for the nesting sites.~~; but this matter is still in the process of being worked out between the California Coastal Commission and the District~~. SCE is, however, responsible for building them. The nesting sites will require annual routine maintenance to prepare them for use. Prior to February 1st of each year, the following should be completed:

1. Inspect all perimeter fencing, if any, and repair as needed.
2. Inspect all gates and locks to assure access to nesting sites is limited to authorized personnel.
3. Remove weedy vegetation from the top and any side slopes adjoining open water. Removal should be by hand or, if necessary, herbicides approved for use near aquatic areas. Herbicides are to be applied by licensed personnel only.
4. Inspect and remove, if necessary, any nearby trees or shrubs that may support predator species.
5. Inspect and replace, as needed, any artificial chick shelters.

In addition to the regular maintenance, a predator management plan should be instituted based on the advice of the US Fish and Wildlife Service and the Department of Fish and Game. The predator management program may consist of passive and/or active control methodologies.

4.8.5 Slope Protection and River Berms

The stone revetments and geotextile-reinforced slopes used to stabilize the slopes along the river berms may require maintenance to maintain structural integrity. The stone revetments and berms will be inspected annually between August and November and following major storm events (greater than the 10 year flood with flows overtopping Lake Hodges Dam) to identify potential areas of erosion and/or loss of armor stone that would impact the berm structural integrity. Potential loss of structural integrity and maintenance would be defined as follows:

1. Loss of stones resulting in a thickness of stones of less than one (1) foot. Maintenance would be to relocate stones that have fallen out of position or add new stones to fill the void in the structure.
2. Soil erosion resulting in pockets or voids of greater than three (3) feet. In these areas, additional soil or rock will be imported from offsite and placed as fill along the slope.

~~The stone revetments and geotextile reinforcedgeotextile-reinforced slopes used to stabilize the slopes along the river berms will require maintenance to maintain structural integrity. The stone revetments will be inspected on a periodic basis and following major storm events to identify potential areas of erosion and/or loss of armor stone. Stones that have fallen out of position will be relocated within the structure or new stones will be used to fill the void in the structure. In areas where soil has eroded, additional soil will be imported from offsite and placed as fill along the slope. The integrity of each river berm will be inspected, prior to each rainy season.~~

Should ~~there be the occurrence of~~ a magnitude 5.5 seismic event occur, originating within a 20 mile radius of the project site, an inspection will be made by a hydrologist, restoration specialist and geotechnical engineer to determine if the damage could have a substantial adverse effect on the ability of the river berms to protect the restored wetlands. SCE will provide a letter summarizing the results of the berm function assessment to the California Coastal Commission (CCC) following the designated seismic event. The letter will provide evidence to support the conclusion of no loss of function or describe the remedial actions necessary to restore the berm function (e.g. reconstruction). The CCC shall review the letter and concur with remedial measures before they are carried out. All recommended remedial measures shall be completed as soon as practical, but no more than six months after remedial measures have been approved by the CCC.

4.8.6 Weir and Culverts

The weir located between the Villages Parcel (DS32) and the Horse Park property will be inspected annually between August and November and following major storms (greater than the 10 year flood with flows overtopping Lake Hodges Dam) to identify any structural damage such as cracking, spalling, or erosion. Any damage judged to result in a loss of structural integrity will be repaired through minor construction activities involving concrete removal, imported fill or rock (as needed for erosion), and concrete replacement. In addition, sediment and debris will be removed from the weir and culverts located in the river berms between August and November and following major storm events (greater than the 10 year flood with flows overtopping Lake Hodges Dam), to maintain the functional performance of these structures.~~The weir located between the Villages Parcel (DS32) and the Horse Park property will be inspected on a periodic basis and following major storms to identify any structural damage such as cracking, spalling, or erosion. Any damage will be repaired through minor construction activities involving concrete removal, imported fill (as needed for erosion), and concrete replacement. In addition, sediment and debris will be removed from the weir and possible culverts located in the river berms on a periodic basis, prior to each rainy season, to maintain the functional performance of these structures.~~

5. RESTORATION PROJECT TO FULFILL SONGS PERMIT REQUIREMENTS

The FRP is designed to provide mitigation for the following three activities to be conducted by Southern California Edison. The primary activity is restoration to accomplish the mitigation required by the SONGS Coastal Development Permit, as ~~discussced~~discussed in Section 1.0. In addition, SCE will accomplish the grading needed to accommodate the Coast to Crest Trail through the project area, as discussed in Section 4.6 of this report. Although the JPA will be responsible for completing and maintaining the trail system, SCE will complete the initial grading. In addition, SCE will complete the grading for a series of five stormwater treatments ponds proposed by the JPA, as discussed in Section 4.6.2.2.~~:~~

This section is intended to document the permanent and temporary wetland impacts associated with these three activities to demonstrate that the permanent impacts are adequately compensated.

While these activities are designed to result in a net increase in the amount and diversity of wetlands, existing wetlands will be impacted in the course of restoration activities. These impacts are classified as permanent or temporary. Permanent impacts occur when existing wetlands are replaced by upland vegetation. Permanent wetland losses are primarily associated with the creation of berms, trails or treatment ponds. Temporary losses occur when existing wetlands are impacted but the area is re-established with some form of wetland habitat. The re-established wetlands may be the same type of wetland habitat or may be converted to another form of wetland habitat. For example, areas of freshwater wetlands may be converted to salt marsh habitat.

5.1 SONGS PERMIT ~~REQUIRMENTS~~REQUIREMENTS

As discussed in Section 1.1, SCE is required to compensate for impacts related to improvements at the San Onofre Nuclear Generating Station (SONGS) by creating new wetland areas through the restoration of the San Dieguito Lagoon. The Coastal Development Permit (CDP) issued for the SONGS project requires SCE create a total of 150 acres of wetlands in Southern California. SCE has selected and the Coastal Commission has approved of the San Dieguito Lagoon as the location where wetland habitat will be created. Condition A, Section 2.1 of the Permit, requires SCE to submit to the CCC Executive Director a final restoration plan and CEQA/NEPA documentation within 60 days following certification of the EIR by the JPA and adoption of the Record of Decision (ROD) by the USFWS. A Draft EIR/EIS for the Park Project was released for public review in January 2000 and the Final EIR/S was completed on September 5, 2000. The EIR/EIS was certified by the JPA on September 15, 2000. However, the Del Mar Sandy Lane Association sued the JPA and SCE in San Diego County Superior Court on October 16, 2000, alleging that the EIR was inadequate in several areas and therefore did not comply with CEQA. On July 27, 2001 the Superior Court ruled in favor of the plaintiffs on several counts and remanded the EIR back to the JPA. SCE and the JPA appealed the ruling and on August 4, 2003, the California Court of Appeals overturned the Superior Court's ruling, dismissed the plaintiffs' petition and upheld the EIR/S. The USFWS then issued a ROD for the project on November 21, 2003.

The FRP represents a stand-alone document that describes the elements of the FRP as specified by the Permit (Condition A, Section 2.1). The FRP focuses primarily on the wetlands restoration effort proposed by SCE to fulfill the Permit conditions, which is the creation or substantial restoration of at least 150 acres of Southern California coastal wetlands within SDL as compensatory mitigation for fish losses caused by SONGS. The FRP is intended to establish the location, habitat type and methodology to be used in creating new wetland habitat. The restoration includes maintaining the lagoon mouth in an open condition throughout the life of the SONGS project. In recognition of the benefits associated with maintaining the mouth of the lagoon, the Coastal Development Permit allowed this activity to represent the equivalent of creating 35 acres of wetlands. Thus, the restoration plan is required to create or restore a total of 115 acres to produce the 150 acres of wetlands mandated by the SONGS CDP. The modules of the restoration project that SCE will create or restore to fulfill the requirements of the Permit are shown in Figure 4.1b and listed in Table 5.1.

As illustrated in Table 5.1, the FRP will create a total of 13~~7.56~~8.38 ~~8.24~~ 38acres of wetlands comprised of a variety of wetland habitats. As illustrated in Table 5.2, the various restoration process itself would impact a total of ~~18.97~~22.3 acres (includes mitigation needed)~~10~~23 of wetlands. Of this, 17.98~~18.97~~ 27 acres would be associated with temporary impacts. ~~A total of 1.00~~0.82 ~~acres of wetlands would be converted to upland habitat (transitional wetlands)~~.

The CCC mitigation requirements for permanently impacted wetlands is 4:1. Based on this, a total of 4.~~.01 32~~3229 acres (assumes reduced size of DS32 without Villages Mitigation Bank disposal requirement) of new wetlands would be required to offset the permanent loss. Mitigation for temporary impacts is 1:1. Thus, re-establishment of temporarily impacted wetlands would be sufficient to compensate for the temporary impact.

As illustrated in Table 5.3, ~~the total number of acres restored by the project would be 138.24~~ 38 ~~acres. When~~ the compensation required for the permanent ~~(4.01~~ 29 ~~acres)~~ and temporary ~~(18.97~~ 27 ~~acres)~~ are subtracted from restored total, the project would create a total of ~~115.26~~ ~~48~~approximately 116 net~~83~~ acres of new wetlands. This would meet the CDP requirement of 115 acres of new wetland habitat.

Thus, the proposed restoration project would meet the requirements of the SONGS CDP by providing a total wetland credit of 150 acres comprised of 35 acres attributed to maintaining an open inlet and a net of 115 acres of restored wetland.

Historically, the 22nd District Agricultural Association undertook development on their property without securing proper permits from the California Coastal Commission. The 22nd District Agricultural Association was thus obligated to construct nesting site habitat in the area between the railroad bridge and Hwy 101 at the inlet. Under the current restoration project, SCE has undertaken the 22nd District Agricultural Association's obligation to build nesting sites in the lagoon area. As such, the California Coastal Commission is not requiring SCE to mitigate for the approximate 2.89 acres of impacts resulting from the construction of these areas.

Habitat created in module W16, known as the Villages Mitigation Bank, is excess habitat not counted towards SCE's fulfillment of it's SONG mitigation requirements. Rather, this area will be a 20.8-acre portion of the Restoration Project, consisting of tidal wetland habitats connecting to the remainder of the restoration site via a tidal channel. The Villages Mitigation Bank will have a potential for credits related to enhancement of existing wetlands in addition to credits for creating wetlands.

5.2 EVALUATION OF SITE-SPECIFIC AND REGIONAL RESTORATION GOALS

The standards and objectives established by the CCC in Condition A of the Permit and the wetlands restoration goals developed by the Public Working Group were used to develop a list of site-specific goals. The regional wetlands' needs and objectives identified by local biologists, resource agency staff, and university researchers were used to prepare a list of regional goals. These two lists are presented below, along with an evaluation of how the restoration plan addresses each goal. More detailed evaluations for some of the site-specific goals below (e.g., Item 3) can be found in the Final EIR/S document September 2000. These goals are compatible with the original, main goal of mitigating for SONGS' impacts to fish.

Table 5.1 Summary of Wetland Habitat Creation by Module – SCE Project Components to Fulfill SONGS Permit Requirements

Habitats	Restored Area (acres)[1] A	Area Required to Compensate for Permanent Impacts (acres)[2,4] B	Area Required to Compensate for Temporary Impacts (acres)[4] C	Net Wetland habitat Creation (acres) A-(B +C)
Tidal Wetland (Below + 4.5 feet, NGVD)				
Subtidal	32.03	0.00	0.33	31.70
Frequently Flooded Mudflats	11.50	0.00	0.00	11.50
Frequently Exposed Mudflats	7.53	0.00	0.00	7.53
Low Coastal Salt Marsh	17.55	0.00	0.000	17.55
Mid Coastal Salt Marsh	38.37	0.40	2.13	35.84
High Coastal Salt Marsh	21.93	0.56	0.86	20.51
Estuarine Flats Inter Tidal	0.00	0.04	0.00	-0.04
Fresh and Brackish Marsh	0.00	0.08	0.44	-0.52
Riparian Southern Willow	0.00	0.01	0.01	-0.02
Total Tidal Wetland	**128.91**	**1.09**	**3.77**	**124.05**
Nontidal Wetland (above + 4.5 feet, NGVD)				
Seasonal Salt marsh	8.65	3.23	14.00	-8.58
Transitional Wetlands	0.82	0.00	0.00	0.82
Estuarine Flats Non Tidal	0.00	0.00	0.21	-0.21
Freshwater Marsh	0.00	0.00	0.00	0.00
Total Nontidal Wetland	**9.47**	**3.23**	**14.21**	**-7.97**
Total Wetland	**138.38**	**14.32**	**17.98**	**116.09**

[1] Approximately 1.3 acres will have sediment and invasive vegetation removed on an every other year bases, with 1/3 of the area at any one time being disturbed and the other 2/3 will be in varying degrees of maturity.

~~**Table 5.1. Summary of Wetland Habitat Creation by Module - SCE Project Components**~~

Habitats	Wetland Habitat Area (Acres)									
	Module No.									*Total*
	W1	*W2A*	*W2B*	*W3*	*W4*	*W5*	*W10*	*TP41*	*W45*	
Subtidal	31.08	-	-	-	0.95	-	-	-	-	**32.03**
Frequently Flooded Mudflats	5.50	-	-	-	8.31	-	-	-	-	**13.81**
Frequently Exposed Mudflats	1.23	-	-	-	3.63	-	-	-	-	**4.86**
Low Marsh	2.94	-	-	-	11.25	3.82	-	-	-	**18.01**
Mid Marsh	3.14	6.22	-	2.96	25.31	1.06	-	-	-	**38.69**
High Marsh	0.38	0.003	8.39	2.58	2.65	0.36	6.66	0.25	-	**21.27**
Freshwater Marsh	-	-	-	-	-	-	-	2.98[1]	-	**2.98**
Riparian Southern Willow	-	-	-	-	-	-	-	1.24	-	**1.24**
Seasonal Salt Marsh	-	-	-	-	-	-	-	-	8.65	**8.65**
Transitional Wetlands	0.29	0.003	0.06	0.03	0.26	0.16	-	-	-	**0.80**
Totals	**44.56**	**6.23**	**8.45**	**5.57**	**52.36**	**5.40**	**6.66**	**4.47**	**8.65**	**142.34**

~~[1] Approximately 1.3 acres will have sediment and invasive vegetation removed on an every other year bases, with 1/3 of the area at any one time being disturbed and the other 2/3 will be in varying degress~~degrees ~~of maturity.~~

~~Table 5.2. Summary of Wetland Habitat Impacted by Module - SCE Project Components~~

Habitats	Wetland Habitat Area (Acres)																
	Module No.																Total
	W1	W2A	W2B	W3	W4	W5	W10	W17	W45	TP41	B7	B8	NS11	NS12	NS15	Trail	
Subtidal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Frequently Flooded Mudflats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Frequently Exposed Mudflats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Low Marsh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mid Marsh	-	0.24	-	0.14	0.03	0.16	1.08	-	-		0.10	-	-	-	-	-	1.7
High Marsh	0.06	0.04	-	0.28	0.06	0.28	0.12	-	-	-	0.10	-	-	1.58	-	0.18	2.7
Seasonal Salt Marsh	4.35	0.03	0.01	1.03	4.14	0.53	3.60	0.19	0.63	1.38	0.06	0.66	0.91	-	0.20	-	17.72
Estuarine Flats Non-Tidal	0.07	-	-	-	0.02	0.10	-	-	-	-	-	-	-	0.13	1.05	-	1.3
Fresh and Brackish Water	-	-	-	-	0.44	-	-	-	-	-	0.02	-	-	-	-	-	0.4
Riparian Southern Willow	-	-	-	-	-	0.01	-	-	-	0.92	-	-	-	-	-	-	0.9
Totals	4.48	0.31	0.01	1.45	4.69	1.08	4.8	0.19	0.63	2.30	0.28	0.66	0.91	1.71	1.25	0.18	24.9

Table 5.2 Summary of Wetland Habitat Impacted by Module – SCE Project Components to Fulfill SONGS Permit Requirements (Based on CCC Wetland Delineation)

Habitats	Wetland habitat Area (Acres) Module No.																Total
	Temporary									*Permanent Impacts*							
	W1	W2A	W2B	W3	W4	W5	W10	W17	W45	B7	B8	DS32[6]	NS11[4]	NS12[4]	NS15	ROAD[5]	
Subtidal				0.02	0.04	0.08	0.17		0.02	0.00				0.01			**0.34**
Frequently Flooded Mudflats																	**0.00**
Frequently Exposed Mudflats																	**0.00**
Low Marsh																	**0.00**
Mid Marsh		0.25		0.14	0.03	0.16	1.55				0.10			0.17			**2.40**
High Marsh	0.07	0.04		0.29	0.06	0.28	0.12				0.14			1.72			**2.72**
Seasonal Salt Marsh	4.13	0.03	0.01	1.04	3.86	0.56	3.60	0.19	0.58	0.66	0.06		0.86			0.09	**15.67**
Estuarine Flats Non Tidal	0.08				0.02	0.10	0.01							0.13			**0.34**
Estuarine Flats Inter Tidal											0.01						**0.01**
Fresh and Brackish Water					0.44						0.02						**0.46**
Freshwater Marsh (nontidal)																	**0.00**
Riparian Southern Willow						0.01										0.002	**0.01**
Unadjusted Impact Totals	**4.28**	**0.32**	**0.01**	**1.49**	**4.45**	**1.19**	**5.45**	**0.19**	**0.60**	**0.66**	**0.33**	**0.00**	**0.86**	**2.03**	**0.00**	**0.090**	**21.95**
Adjusted Impact Totals [3, 4,6]	**4.28**	**0.32**	**0.01**	**1.49**	**4.45**	**1.19**	**5.45**	**0.19**	**0.60**	**2.64**	**1.32**	**0.00**	**0.00**	**0.00**	**0.00**	**0.36**	**22.30**
Habitat Created	**44.73**	**7.08**	**7.56**	**5.55**	**52.22**	**5.49**	**7.10**	**0.00**	**8.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**138.38**
Net Habitat Impacted/Created	**40.45**	**6.76**	**7.55**	**4.06**	**47.77**	**4.30**	**1.65**	**-0.19**	**8.05**	**-2.64**	**-1.32**	**0.00**	**0.00**	**0.00**	**0.00**	**-0.36**	**116.08**

[3] 4:1 requirement for permanent impacts to B7, B8, NS15, and Road.
[4] Mitigation is not required for NS11 and NS12.
[5] Impacts from permanent maintenance road.
[6] Assumes reduced size of DS32 without Villages Mitigation Bank disposal requirement.
* **Temporary impact subtotals:** Unadjusted=17.98, Adjusted=17.98
***Permanent impact subtotals**: Unadjusted=3.97, Adjusted=4.32

~~Table 5.3. Summary of Net Wetland Habitat Creation - SCE Project Components~~

~~*Habitat*~~	~~*Restored Area (acres)*~~[1] A	~~*Area Required to Compensate for Permanent Impacts (acres)*~~[2,3] ~~B~~	~~*Area Required to Compensate for Temporary Impacts (acres)*~~[3] ~~C~~	~~*Net Wetland Habitat Creation (acres)* A-(B+C)~~
~~*Tidal Wetland (below +4.5 feet, NGVD)*~~				
~~Subtidal~~	~~32.03~~	-	-	~~32.03~~
~~Frequently Flooded Mudflats~~	~~13.81~~	-	-	~~13.81~~
~~Frequently Exposed Mudflats~~	~~4.86~~	-	-	~~4.86~~
~~Low Coastal Salt Marsh~~	~~18.01~~	-	-	~~18.01~~
~~Mid Coastal Salt Marsh~~	~~38.69~~	~~0.4~~	~~1.75~~	~~36.54~~
~~High Coastal Salt Marsh~~	~~21.27~~	~~0.42~~	~~1.02~~	~~18.93~~
~~Estuarine Flats Non Tidal~~	~~0.00~~	-	~~0.19~~	~~-0.19~~
~~Freshwater Marsh~~	~~2.98~~	~~0.08~~	~~0.44~~	~~1.16~~
~~Riparian Southern Willow~~	~~1.24~~	~~0.28~~	~~0.86~~	~~0.10~~
~~Total Tidal Wetland~~	**~~132.89~~**	**~~1.18~~**	**~~4.26~~**	**~~127.45~~**
~~*Nontidal Wetland (above +4.5 feet, NGVD)*~~				
~~Seasonal Salt Marsh~~	~~8.65~~	~~3.24~~	~~15.81~~	~~-10.40~~
~~Transitional Wetlands~~	~~0.80~~	-	-	~~0.80~~
~~Total Nontidal Wetland~~	**~~9.45~~**	**~~3.24~~**	**~~15.81~~**	**~~-9.60~~**
~~TOTAL WETLAND~~	***~~142.34~~***	***~~4.42~~***	***~~20.07~~***	***~~117.85~~***

[1] ~~TP41 + (Restored Area - Villages)~~
[2] ~~Based on 4x impact due to 4:1 ratio requirement.~~
[3] ~~No mitigation is proposed or required for nesting site impacts.~~

Table 5.3 Summary of Net Wetland Habitat Creation - SCE Project Components to Fulfill SONGS Permit Requirements

Habitats	Restored Area (acres)[1] A	Area Required to Compensate for Permanent Impacts (acres)[2,4] B	Area Required to Compensate for Temporary Impacts (acres)[4] C	Net Wetland habitat Creation (acres) A-(B +C)
Tidal Wetland (Below + 4.5 feet, NGVD)				
Subtidal	32.03	0.00	0.33	31.70
Frequently Flooded Mudflats	11.50	0.00	0.00	11.50
Frequently Exposed Mudflats	7.53	0.00	0.00	7.53
Low Coastal Salt Marsh	17.55	0.00	0.000	17.55
Mid Coastal Salt Marsh	38.37	0.40	2.13	35.84
High Coastal Salt Marsh	21.93	0.56	0.86	20.51
Estuarine Flats Inter Tidal	0.00	0.04	0.00	-0.04
Fresh and Brackish Marsh	0.00	0.08	0.44	-0.52
Riparian Southern Willow	0.00	0.01	0.01	-0.02
Total Tidal Wetland	**128.91**	**1.09**	**3.77**	**124.05**
Nontidal Wetland (above + 4.5 feet, NGVD)				
Seasonal Salt marsh	8.65	3.23	14.00	-8.58
Transitional Wetlands	0.82	0.00	0.00	0.82
Estuarine Flats Non Tidal	0.00	0.00	0.21	-0.21
Freshwater Marsh	0.00	0.00	0.00	0.00
Total Nontidal Wetland	**9.47**	**3.23**	**14.21**	**-7.97**
Total Wetland	**138.38**	**14.32**	**17.98**	**116.09**

[2]Based on 4x impact due to 4:1 ratio requirement.
[4] No mitigation is proposed or required for nesting site impacts.

5.2.1.1 Site-Specific Goals

1. Improve, preserve, and create a variety of habitats to increase and maintain fish and wildlife and ensure protection of endangered species.

   By keeping the tidal inlet in an essentially open configuration in perpetuity, the restoration plan provides for improvement of existing tidal wetland and surrounding habitats. The excavation, grading, and planting of extensive areas of existing upland/ruderal habitat will create a variety of habitats that will both increase and maintain fish and other wildlife. The restoration project will include the protection, enhancement, and creation of the following habitat types: subtidal, mudflat, coastal salt marsh, seasonal salt marsh, transitional wetlands, nesting sites, and reseeded coastal sage scrub/Reseeded Grasslands. These restored habitats will be on land that will be turned over to public agencies upon completion of the wetland restoration project, thereby preserving the variety of improved and created habitats to ensure protection of endangered species.

2. Ensure adequate tidal and fluvial flushing and circulation with an optimal tidal regime to support a diversity of biological resources while maintaining the appearance of a natural wetland ecosystem.

   Southern California coastal streams, such as the San Dieguito River, naturally vary between a state of fluvial dominance during the wet season and tidal dominance during the dry season, which can ultimately lead to closure during the dry summer months. To maintain the appearance of a natural wetland ecosystem while providing adequate tidal and fluvial flushing, the tidal inlet will be maintained in an open condition via an adaptive management tidal inlet maintenance program. The proposed maintenance program, which was reviewed as part of the environmental review process, will allow the tidal inlet to shoal and scour naturally in response to river and tidal flows as long as the required flushing criteria for tide range and water quality are met. If monitoring reveals that the tide range and/or water quality parameters within the restored wetlands are approaching unacceptable levels then the tidal inlet will be opened or enlarged by mechanical means to provide the flushing criteria needed to support the diverse habitat and fish and wildlife assemblages.

3. Maintain the natural, open space character of the river valley with appropriate topography to support the ecosystem and viewshed.

   The restoration plan will primarily feature open water, mudflat, vegetated coastal salt marsh, seasonal salt marsh, transitional wetlands, nesting sites, and reseeded coastal sage scrub/Reseeded Grasslands and the appearance of these types of habitats will provide a natural, open space character of the river valley. The restoration project will include disposal of excavated soils on existing upland areas or areas under cultivation; however, grading for the upland disposal sites was designed to support the ecosystem and viewshed of the river valley. Visual simulations of the river valley with the restoration project were conducted during the environmental review process to verify that the grading changes necessary to support the ecosystem would not adversely affect the natural, open space character as represented by the existing viewshed.

4. Recommend appropriate land use, erosion, and runoff control policies to be implemented in and around the lagoon and watershed.

   Best management practices will be implemented to minimize erosion and control runoff during construction activities. This will include the utilization of silt fences and low-level berms to trap sediment and maintaining proper soil moisture levels for surface soils to minimize wind erosion. Slopes will be vegetated to control surface runoff and reduce soil erosion. Soil tackifiers and jute netting will be used to reduce slope erosion until vegetation has become established.

   The San Dieguito River Valley contains both private and public lands. The JPA has been making purchases of land to add to the Regional Park. To the extent that these lands can be acquired and managed for natural resource values, the benefits will also accrue to the wetland restoration project. Otherwise, soil and erosion control in the watershed is subject to the state and local authorities that have permitting and enforcement powers. The lands immediately surrounding the restoration site are also owned by public and private entities. The JPA intends to undertake a Master Plan to restore upland habitat on its lands. Other entities must follow state and local regulations for erosion and storm water runoff and proposed development activities within the area of the lagoon and watershed.

5. Designate public access and use areas only at those locations where they will not interfere with a naturally functioning ecosystem or the natural, open space character of the river valley.

   To minimize the potential interference of the natural functions of the restored habitat due to anthropogenic impacts and to maintain the open space character of the river valley, public access or uses will be limited within the restoration area and may be restricted at certain times of year. The restoration project features directed public access and use in fringe areas surrounding the restored habitat such as trails and kiosks. In addition, the public will be able to view the restored habitat from key viewpoints provided along the Coast to Crest Trail through the restored area.

6. Identify and minimize construction impacts.

   The potential short-term impacts associated with construction of the restoration project were identified as part of the environmental review process. Mitigation measures were developed to minimize the effects of any potentially significant construction-related impacts. Mitigation measures include implementation of Best Management Practices, restrictions on type of construction equipment, limitations on timing of construction operations, implementation of traffic control measures, and restoration of any impacted habitat. In addition, biological, cultural, and paleontological monitoring will be conducted during construction to minimize impacts to these resources.

7. Maintain integrity of beach and sand balance, such that the project does not contribute to a net loss of beach sand north or south of the river mouth.

   The restoration project features river berms that were designed such that sand transport through the river after project construction will be essentially identical to sand transport under existing conditions. The restoration project does not include any coastal structures that would potentially impact longshore and/or cross-shore sand transport along the shoreline in the vicinity of the river mouth/tidal inlet. The permanent maintenance of a tidal inlet would reduce the recreational beach area during the dry season when the inlet could be closed under current conditions to tidal exchange. However, the associated sand would be redistributed on upcoast and downcoast beaches; therefore, the project would not contribute to a net loss of beach sand north or south of the river mouth.

8. Use dredged materials for environmentally optimal purposes.

   The dredged/excavated material resulting from restoration activities will be used for a number of environmentally beneficial purposes. Soil of suitable quality (e.g., color, sandy, grain size, etc.) will be used to replenish the local beaches and to construct nesting sites. Fine-grained soil unsuitable for beach disposal will be used to build the bases of nesting sites and construct the river berms that will maintain the existing level of flood protection within the river valley, protect the restored habitat from extreme flood events, and maintain the transport of sediment through the river. The rest of the dredged material will be deposited in on-site disposal sites for creation of upland habitat.

9. Maintain existing conditions of river scour and sand movement through the San Dieguito River.

   Existing river and sediment flow has been established and future flows have been extensively modeled. The restoration project features river berms that were designed such that sand transport through the river after project construction will be essentially identical to sand transport under existing conditions. As designed, the restoration project will not exacerbate existing scour conditions.

10. Location within Southern California Bight

    The restoration project will be within the boundaries of the City of Del Mar and City of San Diego both of which are located within the Southern California Bight.

11. Potential for restoration as tidal wetland, with extensive intertidal and subtidal areas.

    The restoration project will be created through excavation, grading, and planting of an area that historically consisted of large areas of tidal wetland habitat that were transformed to upland habitat through anthropogenic (e.g., filling) and natural processes (e.g., sedimentation). The site currently receives tidal exchange when the tidal inlet is open to the ocean; therefore, the project will provide great potential for tidal wetland restoration with extensive intertidal and subtidal habitat areas as well as seasonal salt marsh, transitional wetland, nesting, and reseeded coastal sage scrub/Reseeded Grasslands habitats.

12. Creates or substantially restores a minimum of 150 acres of wetlands, excluding buffer zone and upland transition area.

    The restoration project will feature the net creation and substantial restoration of 138.~~.24~~38 acres of wetlands of which ~~132~~124.05~~128.88 93~~ would be tidal with its remainder being seasonal salt marsh (~~4.56~~8.65) and transitional wetlands (0.~~80~~82). This area does not include buffer zones or upland transition areas. In addition, the restoration project includes maintaining the tidal inlet in an essentially open condition in perpetuity. As a result, the CCC determined that the associated enhancement of existing tidal wetland habitat represents approximately 35 acres of wetland creation or substantial restoration. Construction of the ~~the~~ restoration project will result in a permanent loss of 1.08 acres of wetland (excluding impacts from nesting sites), which would require a total of 4.32 acres of compensation (4:1 mitigation ratio). Construction of the restoration project will also result in a temporary loss of 17.98 acres of wetland. These 17.98 acres of impacts are considered self-mitigating and would be deducted from the amount of wetlands restored. ~~1.04.12 acres of wetlands which would require a total of 4.01 32acres (impacts from nesting sites are not included) of compensation. Therefore, the restoration project will provide a total of 138.24 acres of restored wetland. Together with the 35 acres of credit for maintaining the inlet, the project would meet the overall requirement of 150.0 acres of wetlands.~~ Therefore, the restoration project will construct a total of 138.38 acres of wetlands, which will result in a net gain of approximately 116 acres of wetland (which includes tidal and non-tidal wetlands) once the impacts of construction on existing wetland have been taken into account. This net gain along with the 35-acre enhancement credit meets the SONGS requirement for 150 acres.

13. Provides a buffer zone of an adequate size to ensure protection of wetland values, and not less than at least 100 feet wide, as measured from the upland edge of the transition area.

    The restoration project provides a buffer zone that is an average of 300 feet wide and at least 100 feet wide as measured from the upland edge of the transition area. In many areas the buffer zone is substantially larger than the 100 feet minimum requirement since the wetlands will be located within an area surrounded primarily by open space.

14. Any existing site contamination problems would be controlled or remediated and would not hinder restoration.

    Extensive soil and water quality testing conducted as part of the environmental review process indicated that the water and soils within the project site did not contain any significant levels of contamination.

15. Site preservation is guaranteed in perpetuity (through appropriate public agency or nonprofit ownership, or other means approved by the Executive Director) to protect against future degradation or incompatible land use.

    The restoration project is either already on public land or is on SCE-owned land that will be transferred to public agencies upon completion of the wetland restoration project, thereby protecting against future degradation and/or incompatible land use.

16. Feasible methods are available to protect the long-term wetland values on the site, in perpetuity.

    The restoration project is either already on public land or is on SCE-owned land that will be turned over to public agencies upon completion of the wetland restoration project, thereby protecting the long-term wetland values of the site in perpetuity. In addition, most of the engineering, construction, and planting methods that will be used for project implementation involve the use of conventional approaches and/or equipment that has been tested through application at other locations. Any innovative methodologies (e.g., inlet maintenance program) that will be used throughout project implementation (i.e., design, construction, and remediation as required) will be monitored and the results will be used to make any modifications necessary to achieve the long-term project goals. Funding will be available to assure that the inlet will be maintained in perpetuity and the wetlands are managed for the life of the SONGS project.

~~17. Does~~

17. The restoration project involves the creation and restoration of habitat through excavation of upland/ruderal areas that do not currently support wetlands. In addition, any impacts to existing wetland resulting from project implementation will be mitigated based on the following requirement. Existing wetland habitat that is converted to the same or different wetland habitat is mitigated at a 1:1 ratio. Existing wetland habitat that is converted to nonwetland habitat is mitigated at a 4:1 ratio. T~~herefore, t~~he Coastal Commission accepted minimal loss of existing wetlands in its approval of the preliminary plan and, in accordance with this approval, an amendment to the SONGS permit is requested.~~restoration project will not result in loss of existing wetlands and will actually increase the total area of wetlands.~~

18. Does not result in impact on endangered species.

    The environmental review that was conducted for the restoration project concluded that the project will not result in significant, long-term, adverse impacts on endangered species. Biological observers will monitor construction activities to minimize the risk of short-term constructed-related impacts to endangered species. If potential impacts are identified then the biological observers will redirect construction activities to locations away from the endangered species or their habitat. The project will result in significant, long-term, beneficial impacts on endangered species such that endangered species are expected to use some of the created and substantially restored habitat. For example, the Belding Savannah Sparrow is expected to utilize the high coastal salt marsh habitat for nesting and the California Least Tern is expected to use the subtidal and intertidal areas for foraging. The potential exists that as a result of wetland restoration at this site, endangered species habitat and populations will be greatly enhanced.

19. Provides maximum overall ecosystem benefits (e.g., maximum upland buffer, enhancement of downstream fish values, provides regionally scarce habitat, potential for local ecosystem diversity).

    The USFWS, NMFS, CDFG, CCC, JPA, and SCE conducted an evaluation of five restoration alternatives during the environmental review process and determined that the Mixed Habitat Alternative (presented in modified form herein as the FRP) provides the maximum overall ecosystem benefits. The USFWS prepared a letter summarizing the evaluation procedure and a copy of the letter is provided in Appendix B. The restoration project achieves the optimum balance of upland buffer, transition areas, fish habitat, and regionally scarce habitat with the least amount of impact to existing habitat and infrastructure. Maintenance of a tidal inlet and creation of subtidal and intertidal areas will provide habitat for fish, benthos, and aquatic vegetation. The creation of a relatively large amount of coastal salt marsh will provide aggregate increases in regionally scarce habitat and enhance habitat for some endangered or sensitive species. Maintaining adequate buffer zones and limiting future land uses through implementation of the San Dieguito River Park Plan will provide sufficient upland buffers to support wetland habitat functions in perpetuity. Creation of nesting areas will also provide habitat for endangered species.

20. Provides substantial fish habitat compatible with other wetland values at the site.

    A relatively large portion of the restoration project will consist of subtidal habitat west of Interstate 5 that will provide substantial fish habitat. The subtidal habitat will transition to intertidal, transitional wetlands, and seasonal salt marsh habitats so that the fish community that eventually develops within the subtidal portion of the restored wetlands is compatible with other wetland values at the site. Recent studies within Southern California have shown the importance of intertidal habitat (i.e., marshes, tidal sloughs, and shallow mudflats) in providing vital habitat and production sites for estuarine fish; therefore, the intertidal areas will provide additional fish habitat. Restoration of subtidal habitats at Anaheim Bay and Batiquitos Lagoon has resulted in substantial increases in use by coastal and estuarine fish.

21. Provides a buffer zone of an average of at least 300 feet wide, and not less than 100 feet wide, as measured from the upland edge of the transition area.

    The restoration project provides a buffer zone that is an average of 300 feet wide and at least 100 feet wide as measured from the upland edge of the transition area. In many areas the buffer zone is substantially larger than the 100 feet minimum requirement since the wetlands will be located within an area surrounded primarily by open space and agricultural land uses.

22. Provides maximum upland transition areas (in addition to buffer zones).

    Much of the undeveloped land that surrounds the restoration project will be owned and managed by the JPA for the purposes of natural habitat restoration. Disposal areas on the perimeter of the project will be restored to coastal sage/natural grassland habitat as well. These areas will provide refugial habitat for species during high tides and storm events and are important for many sensitive plant and animal species. As a result, the project will provide substantial upland transitional areas.

23. Restoration involves minimum adverse impacts on existing functioning wetlands and other sensitive habitats.

    The potential adverse impacts to functioning wetlands and other sensitive habitats associated with construction of the restoration project were identified as part of the environmental review process. Mitigation measures were developed to minimize the effects of any potentially significant construction-related impacts. Mitigation measures included implementation of Best Management Practices, restrictions on type of construction equipment, limitations on timing of construction operations, implementation of traffic control measures, and restoration of any impacted habitat. In addition, biological, cultural, and paleontological monitoring will be conducted during construction to minimize impacts to these resources.

The potential adverse impacts to functioning wetlands and other sensitive habitats associated with long-term implementation of the restoration project were also identified as part of the environmental review process. Mitigation measures were developed to minimize the effect of the impacts or to compensate for any long-term habitat losses. For example, any long-term impacts to existing wetland habitat that is converted to the same or different wetland habitat will be mitigated at a 1:1 ratio. Any long-term impacts to existing wetland habitat that is converted to nonwetland habitat will be mitigated at a 4:1 ratio. The restoration project seeks to avoid grading within existing wetland areas to minimize impacts to existing wetlands and other sensitive habitats. Therefore, grading within existing wetlands is proposed only at locations that require slope stabilization, inlet maintenance, habitat restoration (wetlands and nesting), berm construction, and disposal of excavated soil (beach).

24. Site selection and restoration plan reflect a consideration of site specific and regional wetland restoration goals.

    The restoration plan was developed in full consideration of the site-specific goals established by the CCC, resource agencies, and public working group as well as the regional wetlands restoration goals identified by local biologists, university faculty, and resource agencies. The site-specific goals are addressed in this list and the regional goals are addressed in the list presented below.

25. Restoration design is that most likely to produce and support wetland-dependent resources.

    The restoration project was designed to provide a diverse mixture of wetland habitats including subtidal, mudflat, coastal salt marsh, transitional wetlands, seasonal salt marsh, and nesting areas, instead of focusing primarily on one or two habitat types. The diverse habitat mix was selected to produce and support wetland-dependent resources such as aquatic vegetation, fish, benthos, coastal salt marsh vegetation, amphibians, reptiles, small mammals, and birds.

26. Provides rare and endangered species habitat.

    The restoration project is designed to provide habitat for numerous rare and endangered species including the California Least Tern (Sterna antillarum browni), Western Snowy plover (Charadrius alexandrinus nivosus), Light-footed Clapper Rail (Rallus longirostris levipes), Beldings Savannah Sparrow (Passerculus sandwichensis beldingi), California Brown Pelican (Pelecanus occidentalis californicus), Coastal California Gnatcatcher (Polioptila californica), Least Bell's Vireo (Vireo bellii pusillus), and Pacific Little Pocket Mouse (Perognathus longimembris pacificus). In addition, the restoration project is included in a Master Plan that will include habitat creation and management elements to support some of the life requirements of the species listed above as well as additional species.

27. Provides for restoration of reproductively isolated populations of native California species.

    A number of sensitive plant species are found within the San Dieguito Lagoon including the Del Mar Mesa Sand Aster (*Corethyogyne filaginifolia v. linifolia),* San Diego Marsh Elder (*Iva hayesiana),* Southwestern spiny rush (*Juncus acutus spp. leopoldii*), and

Coulter's goldfields (*Lasthenia coulteri*). The restoration plans include provision for the protection and creation of habitat that will benefit these species. In addition, experimental seed collection, transplantation, and establishment are included as mitigation measures in the FEIR.

Most of the wildlife that will benefit from the project are migratory and/or range widely. However, efforts will be made to provide habitat for species that have limited distribution in southern California such as the Light-footed Clapper Rail and Belding's Savannah Sparrow. Protections are also provided for the Burrowing Owl (*Speotyto cunicularia*).

28. Results in an increase in the aggregate acreage of wetland in the Southern California Bight.

    Since the restoration project is located within the Southern California Bight and the project consists of the restoration of coastal wetland habitat, project implementation will result in an increase in the aggregate acreage of wetland in the Southern California Bight.

29. Requires minimum maintenance.

    Once completed and the vegetation is established, the restoration project will require minimal maintenance to improve the functional performance of the restored ecosystem. The inlet will be maintained in an essentially open condition in perpetuity through implementation of a tidal inlet maintenance program utilizing conventional construction equipment approximately one to two times per year. The berms will confine the river flows, thereby reducing flood damage (i.e., berms, slope protection and possible culverts) to the restored wetlands and the associated maintenance. There are no mechanical devices (e.g., tide gates) incorporated into the restoration project so maintenance of hydraulic control structures (i.e., possible culverts, berms, and slope protection) will be limited to biofouling removal, slope revegetation, sediment excavation, and slope protection repair (e.g., replace fallen stones). Periodic removal of exotic species will be required for the restored vegetated wetland and upland areas, including upland soil disposal sites. Berms and culverts will be inspected annually prior to each rainy season to ensure functionality.

    Berms and culverts will be inspected annually between August and November and following major storms (greater than the 10 year flood with flows overtopping Lake Hodges Dam) to identify any structural damage such as cracking, spalling, or erosion. Any damage judged to result in a loss of structural integrity will be repaired through minor construction activities involving concrete removal, imported fill or rock (as needed for erosion), and concrete replacement. In addition, sediment and debris will be removed from the weir and culverts located in the river berms between August and November and following major storm events (greater than the 10 year flood with flows overtopping Lake Hodges Dam), to maintain the functional performance of these structures.

30. Restoration project can be accomplished in a timely fashion.

    With completion of the environmental review, construction of the restoration project can proceed after final permitting and engineering design (i.e., final design). The final design effort should take between one and one and a half years, which is similar to other coastal restoration projects conducted within Southern California (e.g., Anaheim Bay Mitigation Project). Construction will take between one and two years, which is also similar to other coastal restoration projects conducted within Southern California (e.g., Batiquitos Lagoon Enhancement Project).

31. Site is in proximity to SONGS.

    The restoration project will be located in the City of Del Mar, California, which is located approximately 35 miles south of SONGS. SONGS and the restoration project are both located in San Diego County.

5.2.1.2 Regional Goals

The regional goals presented below were developed from the findings of the regional coastal wetlands restoration needs assessment conducted by MEC Analytical Systems, Inc. (MEC) and summarized in the July 1993 MEC report titled, "San Dieguito Lagoon Restoration Project; Regional Coastal Lagoon Resources Summary; San Onofre Marine Mitigation Program." An evaluation of how the regional goals are met by the restoration project is provided below for each goal.

1. Increase coastal wetlands habitat in the middle of the Southern California region between Tijuana River and Anaheim Bay.

   San Dieguito Lagoon is located approximately 30 miles north of the Tijuana Estuary and 75 miles south of Anaheim Bay; therefore, the restoration project will provide an increase in tidal wetlands habitat in the middle section of the Southern California coastal zone. The restoration project will support the regional goal of providing additional open water, intertidal, mudflat, coastal salt marsh, transitional wetlands, and seasonal salt marsh habitat for nesting and foraging of resident and migratory estuarine birds and shorebirds.

2. Increase the acreage of coastal salt marsh in Southern California.

   One of the goals of the restoration project was to increase the aggregate acreage of coastal salt marsh habitat within Southern California. A habitat mix consisting of subtidal, intertidal mudflat, coastal salt marsh, transitional wetlands, and seasonal salt marsh habitat was developed to provide a fully functional estuarine and tidal wetlands system instead of a subtidal habitat system focused solely on fish and other aquatic species. The restoration project will provide about 92.61~~80.0~~ acres of coastal salt marsh habitat.

3. Provide increased nesting areas for the California Least Tern and Western Snowy Plover in the middle of the Southern California region between Tijuana Estuary and Anaheim Bay.

   The overall restoration plan features the construction of four nesting sites composed of sand and shell fragments that will provide nesting habitat for the California Least Tern and Western Snowy Plover. The project also includes rehabilitation of an existing nesting site through weed removal and surface restoration (i.e., raking). Construction of the four new sites plus rehabilitation of the existing site will provide ~~14.4~~12.3 acres of nesting habitat for the California Least Tern and Western Snowy Plover. In addition, the subtidal and intertidal habitat created and/or substantially restored through project implementation will provide foraging areas for these and other bird species.

4. Provide increased nesting areas for the Light-Footed Clapper Rail in the middle of the Southern California region between Tijuana Estuary and Anaheim Bay.

   Approximately ~~18.0~~~~21.16~~17.55 acres of low coastal salt marsh (primarily cordgrass) will be created through implementation of the restoration project. Cordgrass may provide nesting habitat for the Light-footed Clapper Rail, which maintains limited breeding pair populations between Upper Newport Bay and Tijuana Estuary.

5.3 COST ESTIMATES

The construction cost estimates to implement the tidal wetland, nesting site, disposal site, transitional wetland, and seasonal salt marsh components of the restoration project are summarized in Table 5.4. The cost estimates include contingencies (20%), permitting/design (estimate), and construction management (6%). In addition, an allowance for potential river infrastructure components has been included in the estimate. The total estimated construction cost is approximately $40.6 million.

In addition to construction, the cost to implement the restoration project includes the costs associated with site selection, conceptual design, preliminary engineering, environmental review, permitting, final design, monitoring, and remediation. Some of these costs may form a significant component of the overall project cost, especially where extensive site selection, public/agency coordination, and environmental review is required.

Table 5.4.San Dieguito Wetlands Restoration Project Construction Cost Estimate

(SCE Permit Components and Nesting Sites)

Item	*Estimated Cost*
Site Access, Mobilization, Demolition	$2,395,000
Earthwork West of I-5	$9,176,000
Earthwork East of I-5	$8,498,000
River Berms	$1,881,000
Nesting Sites	$1,109,000
Utility Relocation / Protection	$139,000
Revegetation	$4,722,000
Subtotal	$27,920,000
Contingencies (20%)	$5,584,000
Engineering / Environmental Services	$4,800,000
Construction Management (6%)	$2,298,000
Total	**$40,603,000**

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